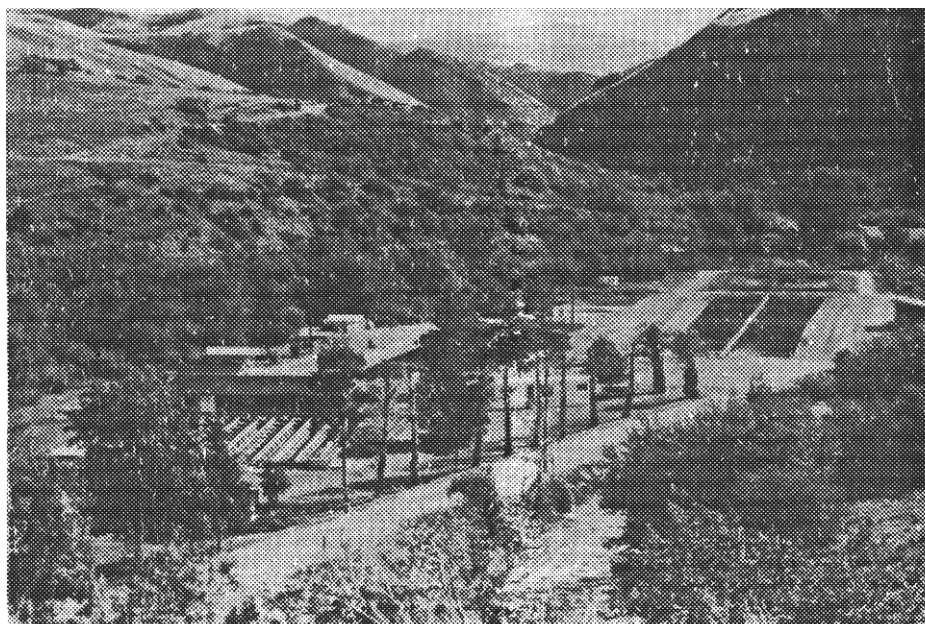




# **RAPID RIVER HATCHERY**

## **1993 CHINOOK BROOD YEAR REPORT**



by

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## ABSTRACT

The Rapid River trap operated from March 17 to September 13, 1993. From May 11 to August 17, 4,468 spring chinook *Oncorhynchus tshawytscha* were collected. This included 4,451 adults (2,001 males, 2,450 females) and 17 jacks. Summer chinook, totaling 690 adults (330 males, 360 females) and 4 jacks, were trapped from July 1 to August 25. Summers were released into Rapid River above the hatchery. Age class structure was: 17 - 3yr, 2,546 - 4yr, 1,905 - 5yr for springs, and 4 - 3yr, 255 - 4yr, 435 - 5yr for summers. There were 162 wild and 40 hatchery steelhead *O. mykiss* trapped from March 29 to July 6. Wild steelhead were released above the hatchery. Hatchery steelhead were released into the Little Salmon River. A total of 148 bull trout *Salvelinus confluentus* were trapped and released into Rapid River above the hatchery from May 12 to August 17. The Oxbow Hatchery trapped 431 spring chinook in Hells Canyon, and transported 411 to Rapid River for spawning. In 1993 the sport fishery on the Little Salmon River yielded 430 chinook and Nez Perce tribal officials reported a harvest of 696. On August 12, 120 pairs of adults were removed from holding and released in Newsome Creek, and from August 16-18, 160 pairs were released into the American River.

Prespawning mortality was 424 adult males (8.65%), 582 females (11.88%), and 1 jack (0.02%) for a total of 1,007 fish (20.55%). Spawning took place from August 6 to September 17, 1993. A total of 1,737 females were spawned yielding approximately 7,103,037 green eggs. As spawning progressed, 2,401,107 green eggs were transferred to Clearwater Hatchery, and 1,072,752 were shipped to Oxbow Hatchery for incubation to the eyed stage and returned to Rapid River Hatchery for enumeration and final incubation. Overall, 699,390 eggs from 171 females were culled prior to enumeration (441,720 eggs from 180 females at Rapid River, 32,720 eggs from 8 females at Oxbow, and 224,950 eggs from 55 females at Clearwater). After enumeration and primary picking the total inventory at Rapid River Hatchery was 3,940,603 eggs. Average fecundity was 3,742 eggs per female from 1,053 females and survival to eye-up was 93.2%. On October 19, 1993, 125,734 eyed eggs were transferred to Sawtooth Hatchery. After secondary picking 33,023 and culling of an additional 712,614 eggs and sac fry, Rapid River Hatchery started brood year 1993 with an inventory of 3,069,232 eyed eggs (based on electronic counting with a Jentsorter counter). This yielded a survival to swim-up of 87.3% (not including culled eggs or fry).

From January 3 to March 13, 1994, fry were moved into seven raceways. On April 14, 101,950 fingerlings were transferred back to Rapid River Hatchery from Sawtooth Hatchery. Mortality during the initial rearing period prior to marking was 35,328. Marking of Brood Year 1993 fingerlings started on May 11, 1994. The marking crew reported adipose fin clipping of 3,300,696 fingerlings (+5% from hatchery inventory). As in the past this number was used for inventory at the start of final rearing. Marking also included implant of 515,679 coded-wire tags (CWT). Prior to release 2,488 were PIT (Passive Integrated Transponder) tagged. From March 16 to April 12, 1995, 2,786,919 smolts (149,377 lbs) were released to Rapid River. March 28-30, Idaho Power Company (IPC) transported 499,536 smolts (26,030 lbs) for release into the Snake River below Hells Canyon Dam. Total hatchery release was 3,286,455 smolts (175,407 lbs). This was a survival of 99.6% for the final rearing period after marking.

Feed conversion for 1993 brood year spring chinook was 1.45 prior to the start of volitional release. A qualitative feed study of BioDry 1000 vs BioMoist Feed showed no difference in growth.

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## **INTRODUCTION**

### **Funding Source**

Rapid River Hatchery was constructed in 1964 by Idaho Power Company (IPC) to mitigate for losses of spring chinook salmon *Oncorhynchus tshawytscha* resulting from the construction of Brownlee, Oxbow, and Hells Canyon dams on the Snake River. Mitigation mandated by the Federal Energy Regulatory Commission required IPC to transplant the run of spring chinook salmon from the Snake River to the Salmon River drainage and to provide funds for the production of 3 million spring chinook salmon smolts annually. These fish are designated for release into Rapid River and the Snake River below Hells Canyon Dam. Historical operational data is compiled in Appendices 28-31.

### **Location**

Rapid River Hatchery is located in Idaho County seven miles southwest of the community of Riggins. It lies on Rapid River, a tributary of the Little Salmon River. Travel distance for salmon to the ocean is approximately six hundred river miles. Rapid River Hatchery is staffed and operated by the Idaho Department of Fish and Game (IDFG) and is funded by IPC.

## **OBJECTIVES**

The objectives of Rapid River Hatchery are:

1. To annually produce three million spring chinook salmon smolts. The average size is to be approximately 22.7 g (20 fish/lb). These fish are to be released into Rapid River and the Snake River below Hells Canyon Dam.
2. To trap and spawn adult spring chinook salmon returning to Rapid River.
3. To evaluate various strategies and techniques for rearing spring chinook salmon.
4. To provide eggs and/or fry for supplementation purposes.

## **FACILITY DESCRIPTION**

Fish rearing facilities at Rapid River Hatchery consist of 50 double stack Heath incubators, 12 outdoor concrete raceways (6 ft x 90 ft), and 6 earthen rearing ponds with concrete side walls: Pond 1A and B (42 ft x 199 ft each), Pond 2A and 2B (35 ft x 197 ft each), and Pond 2C and 2D (37 ft x 173 ft each). One concrete adult holding pond (80 ft x 25 ft) and two earthen holding ponds, HP2 (40 ft x 150 ft) and HP-3 (80 ft x 250 ft), provide space for holding up to 10,000 adult spring chinook salmon prior to spawning. Production capacities by unit are listed in Appendix 1. Rearing space by unit is shown in Appendix 2.

Rapid River Hatchery facilities include a fish trap located on Rapid River approximately 1.5 miles downstream from the hatchery. It is designed to trap and hold upstream migrating adult fish. The trap consists of a permanent wooden velocity barrier, a seven-step fish ladder, and a two-stage trap. Adult salmon

are transferred from the trap by means of an Alaska Steep Pass Ladder to a 500-gallon bucket operated by an overhead hoist, and then to a 1,000-gallon tank truck for transport to the hatchery. In 1994 the trap facility was modified to allow unimpeded upstream migration of anadromous and resident species around the velocity barrier during periods when trapping operations are not in progress.

As part of our mandate to evaluate production methods we have identified two specific areas where improvement can be made by modifying the existing facility. One relates to adult salmon handling and the other to general hygiene and disease control. The average prespawning mortality at Rapid River Hatchery from 1970 to 1994 is 18.3%. Examination of the prespawning mortality curve (Appendix 40) shows that a sharp increase occurs after first sort and subsequent handling of the adults. Our current method of gathering fish for sorting involves netting all adult fish in a large seine each spawn day. This results in severe handling stress of the fish twice a week during spawning season. An improved method for crowding adult fish can have a direct affect on prespawning mortality. This would require facility modification to provide a better environment for holding adult salmon. The other area of improvement involves the way water is supplied to rearing pond number one. All water entering pond one must pass through outdoor raceways. Consequently we can never dry up the raceway system or disinfect it. All water supplied to ponded fish must pass over fingerlings in the raceways. When the raceways are empty they form a reservoir for the accumulation of bacteria, detritus, and other material. The solution to this problem would be a simple bypass of the raceway system to supply water to the rearing pond.

## **WATER SUPPLY**

### **Water Source**

Rapid River originates in Adams County and flows through an undeveloped canyon before reaching the hatchery. The drainage is protected as part of the Wild and Scenic Rivers Act and is not subjected to perturbations, such as logging or road building. Rapid River generally provides excellent water for rearing spring chinook salmon however the length and steep nature of the drainage make it a highly variable river. Spring runoff and flash floods can be violent and carry a tremendous volume of silt into the hatchery. High water during the spring of 1993 peaked at 905 cfs on May 29 providing better up-stream migration conditions than in recent drought years. In winter, flows decline as the upper part of the drainage freezes and ice may block the river. During the winter of 1993 - 1994 flow in Rapid River declined to 39.9 cfs. Another critical period for flow conditions occurs during fish marking (see the Fish Health section). In 1994 marking of brood year 1993 fingerlings occurred during high water. The peak flow occurred on May 11, but was only 350 cfs. This low runoff and relatively clear water conditions were optimal for marking. Specific flow information for emigration in the spring of 1995 is not available at this time but will probably exceed high water in 1993. Water temperature is also quite variable. The minimum in January is about 34°F and the maximum in August can exceed 60°F. Pond temperatures during adult holding are shown in Appendix 15.

### **Water Supply**

Hatchery water is obtained through one 30-inch and one 24-inch pipeline. A five-foot high wooden diversion dam provides the necessary hydraulic head. Rapid River Hatchery has specific water rights under state license to 28 cubic feet of water per second (cfs) for the hatchery facility and 18.6 cfs for the fish trap. Rearing units operate on gravitational flow. Water for the incubation system is pumped from the headrace by one of two 7.5-horsepower electric pumps. A gasoline-operated pump and a gravitational flow filter bed provide water during electrical failures. Water quality parameters are listed in Appendix 3.

## **STAFFING**

Rapid River Hatchery is staffed by three permanent employees: a Fish Hatchery Superintendent II, an Assistant Fish Hatchery Manager, and a Fish Culturist. Approximately five seasonal employees are hired each year from February through November. The Summer Youth Employee Training Program may provide one or two employees to assist with grounds maintenance. Housing accommodations include three residences for the permanent staff and a 65 ft x 14 ft mobile home for seasonal employees.

## **FISH PRODUCTION**

### **Adult Collection**

#### **Spring Chinook Salmon Returns to Rapid River**

The Rapid River fish trap operated from March 17 through September 13, 1993. Water conditions were highly variable and at times unfavorable for trapping. High water and sand deposition required that the trap be closed from May 15 to May 23, June 1 to June 4, and June 7 to June 9. During trapping operations spring chinook were collected for spawning purposes. Summer chinook, steelhead, and bull trout were also collected and transported above the hatchery intake for release into Rapid River.

The first spring chinook was trapped on May 11 and the last on August 17, 1993. The majority of the run entered the trap from June 8 to June 30 with a peak during the week of June 30 (Appendix 4 and 32). This year 4,468 fish (4,451 adults and 17 jacks) were trapped. The sex-ratio of the salmon run was 2,001 adult males (44.79%), 2,450 females (54.83%), and 17 jacks (0.38%). Polymodal analysis of fork length measurements were used to determine the age-class structure. Age-class composition of the 1993 run was 17 (0.38%) three-year-olds (0-53 cm), 2,546 (56.98%) four-year-olds (54-80 cm), and 1,905 (42.64%) five-year-olds (81=> cm), (Appendix 5 and 33)

Throughout the trapping period a total of 23 spring chinook, 3 summer chinook, and 4 steelhead were found to have jaw tags and/or radio transmitters placed on them by the University of Idaho or by National Marine Fisheries Service (NMFS). Specific tag recovery data is shown in Appendix 6. The CWT information revealed one Rapid River adult that strayed to the Pahsimeroi River and three strays to Hells Canyon.

Injuries were documented throughout the trapping season. When multiple injuries were present on the same fish they were recorded separately. Injuries consisted of 613 nitrogen burns, 189 gill net scars, 98 gaff wounds, and 328 injuries of unknown origin (Appendix 7).

This year 280 male and 280 female adult brood stock were transferred and released into tributaries of the South Fork of the Clearwater River. On August 12, 120 pairs were hauled to Newsome Creek. On August 16 and August 18, 160 pairs were hauled to the American River. The fish were transported by Clearwater Hatchery staff and arrived in good condition.

#### **Hells Canyon Spring Chinook Salmon Returns**

The spring chinook run to Oxbow Hatchery's Hells Canyon Trap totaled 431 fish. IPC personnel transported 411 adult fish collected from the Hells Canyon trap to Rapid River Hatchery. The age-class composition of spring chinook in the Hells Canyon run was 2 three-year-olds (0.46%), 195 four-year-olds (45.24%), and 234 five-year-olds (54.29%). The sex-ratio of the Hells Canyon run was 2 jacks (0.46%), 229



adult males (53.13%), and 200 females (46.4%). Year-class information is based on length frequency information. For more information see the Oxbow Hatchery 1993 Spring Chinook Broodyear Report.

### **Inventory of Miscellaneous Species**

Summer chinook were counted from July 1 through August 25, 1993. After July 15 all salmon that were not marked with an adipose fin clip were designated summer chinook. Prior to July 15 summer chinook were differentiated based on external appearance. The timing of the summer component of the run is shown in Appendix 8 and 34. This component of the Rapid River run included 690 adults and 4 jacks. These fish were measured to the nearest centimeter fork length (Appendix 9 and 35), injected with antibiotic, then released. Three of the summer chinook arrived at the trap with severe injuries and were not viable for release. The remaining 691 fish were released above the hatchery into the Rapid River drainage. The age-class composition of this part of the salmon run (based on length frequency information) was 4 three-year-olds (0.58%), 255 four-year-olds (36.74%), and 435 five-year-olds (62.68%). The sex-ratio was 330 adult males (47.55%), 360 females (51.87%), and 4 jacks (0.58%).

From March 29 through July 6, 1993, 202 adult steelhead were trapped (Appendix 10 and 36) and measured to the nearest centimeter fork length (Appendix 11 and 37). The steelhead run included 162 wild fish and 40 hatchery fish. The sex-ratio was 46 wild males, 116 wild females, 25 hatchery males, and 15 hatchery females. Steelhead of hatchery origin were transported back to the Little Salmon River and released approximately one mile upstream from its confluence with Rapid River. Wild steelhead were released into Rapid River upstream from the hatchery intake.

A total of 148 bull trout were trapped from May 12 through August 17, 1993 (Appendix 12 and 38). These fish ranged in size from 21 centimeters to 59 centimeters total length (Appendix 13 and 39). Department researchers continued a study of bull trout movement this year. They conducted habitat surveys and implanted radio transmitters. Periodic radio tracking was used to determine fish movement. Further information regarding this study should be obtained from Dan Schill, IDFG. An inventory of all species trapped in 1993 is shown in Appendix 18.

### **Harvest Data/Sport and Tribal Fishery**

In 1993 there was a sport fishery on the Little Salmon River From May 22 through June 21. There was also a Nez Perce Tribal fishery on Rapid River. Department creel census information estimated 430 spring chinook were taken by sport fishermen. Tribal officials reported a harvest of 696 fish.

### **Holding and Spawning**

#### **Adult Treatments**

Hatchery personnel removed chinook from the trap daily and processed them on site. They were measured, injected, and then transported to the hatchery. All chinook received an intraperitoneal injection of Erythromycin base injectable (Gallimycin 100) at one of two test rates (20 mg/kg or 30 mg/kg). A total of 4,451 spring chinook (total run of 4,468 minus 17 fish that were not viable for ponding) were injected (2,396 at low-rate, and 2,055 at high-rate). Summer chinook were injected at 10mg/kg. The administration of this antibiotic was performed in accordance with INAD number 6,430.

When they arrived at the hatchery spring chinook were segregated into various ponds for holding until spawning. They were allocated to HP-1 (Hells Canyon returns), HP-2 and HP-3 (Rapid River returns). The holding period extended from May 11 to September 17. Formalin treatments were used from June 18 to August 25 to control ectoparasites and reduce prespawning mortality. A prophylactic drip treatment regime of 170 ppm formalin for one hour, three times per week was used. During the holding and spawning period, water temperatures ranged from 41°F to 60°F (Appendix 15). Carcasses from holding and spawning were hauled to a landfill near Grangeville, Idaho by the Walco Company.

## **Prespawning Mortality**

The combined prespawning mortality for Rapid River and Hells Canyon spring chinook was 1,07 fish (20.56%). Individually, Rapid River prespawning mortality was 936 fish (19.11%), and Hells Canyon prespawning mortality was 71 (1.45%). The sex-ratio was 424 adult males (8.65%), 582 females (11.88%), and 1 jack (0.02%), i.e., 400 adult males (8.16%) and 536 females (10.94%) for Rapid River, and 1 jack (0.02%), 24 adult males (0.49%), and 46 females (0.94%) for Hells Canyon. These numbers include mortality at Oxbow Hatchery prior to transport to Rapid River Hatchery, and percentages are of 4,899 total fish trapped. A profile of prespawning mortality (as percent of fish trapped to date) is shown in Appendix 40.

Hatchery personnel performed routine necropsies of all prespawning mortalities. Bacterial Kidney Disease (BKD) related mortality was 59 fish or 1.20% of fish trapped (5.86% of prespawning mortality). Causal factors for prespawning mortality are shown in Appendix 14. Snouts were collected from 501 adipose fin-clipped fish and sent to the IDFG Fish Marking Laboratory at Lewiston Idaho, for CWT analysis.

## **Spring Chinook Salmon Spawning**

In 1993, a total of 1,737 female spring chinook (1,587 Rapid River, 150 Hells Canyon) were spawned from August 6 to September 17, yielding 7,103,037 eggs. During spawning an additional 47 Rapid River females and 4 Hells Canyon females were destroyed and their eggs discarded for the following reasons: poor egg quality, premature egg development, spawn out, bloody ovarian fluid, or gross symptoms of BKD. Each female was sampled during spawning for BKD analysis. We followed updated spawning protocol. Females were killed with a blow to the head, and not bled prior to removing eggs. The change from previous bleed-out procedure has shown no affect on eyeup (93.2% 1993). Eggs from single females were put into a colander to drain off the ovarian fluid prior to fertilization, transferred to a bucket, fertilized with the milt from one male, and mixed with approximately 250 ml of well water to activate the sperm. Jacks were included at random for fertilization throughout the spawning season. All fertilized eggs were water hardened for 30 minutes in a minimum of 100 ppm Argentyne. After water hardening, eggs to be incubated at Rapid River Hatchery were placed in Heath vertical stack incubators. Eggs to be transferred to other stations were water hardened in EggBOX coolers using EggTUBE containers manufactured by the AquaSeed Corporation and then shipped. As spawning progressed, 2,401,107 eggs from 568 females were transferred to Clearwater Hatchery, 1,072,752 eggs from 280 females were shipped to Oxbow Hatchery, and 3,629,178 eggs from 889 females were kept at Rapid River Hatchery. See the Incubation and Egg Transfers sections for actual numbers of eggs transferred and returned. Complete egg enumeration and disposition data is compiled in Appendix 16.

## **Incubation**

Eggs were incubated at a rate of one female per tray to allow segregation of individual fish pending results from enzyme-linked immunosorbant assay (ELISA) studies. Single female per tray incubation was new here this year and exceeded the incubation capacity of Rapid River Hatchery. Green eggs from 280 females were shipped to Oxbow Hatchery for incubation to the eyed stage then returned to Rapid River Hatchery to ensure

adequate inventory after culling eggs from females tested positive for BKD. Green eggs from 568 females were transferred to Clearwater Hatchery to supplement their program (see Fish Distribution). Appendix 16 lists egg survival data by lot.

In 1993, 699,390 eggs from 171 females that tested disease-positive were culled prior to enumeration. Spawn from females with high ELISA titers ( $>.60$ ) were discarded after test results were received from the pathology laboratory. In addition, eggs from females that tested positive for Infectious Hemopoietic Necrosis (IHN) were discarded. This equals 32,720 eggs from 8 females culled at Oxbow Hatchery, 441,720 eggs from 108 females culled at Rapid River Hatchery, and 224,950 eggs from 55 females culled at Clearwater Hatchery. These eggs and females are not included in the numbers given for survival, or fecundity, because specific mechanical enumeration data is not available. The results of ELISA titers are shown in Appendix 17.

Approximately 3,187,458 green eggs were incubated to primary pick and enumerated at Rapid River Hatchery. These were all from Rapid River stock and taken at this station. Incubation temperature ranged from 36<sup>o</sup>F to 58<sup>o</sup>F, and flow was set to 6 gpm. Average eyeup for this group was 93.1% yielding 2,968,548 eyed eggs and an average fecundity of 4,082 for 781 females. An additional 1,040,032 green eggs from 272 females retained at Oxbow Hatchery provided 972,055 eyed eggs after return to Rapid River for incubation and enumeration. This group had an average eyeup of 93.5% yielding and a fecundity of 3,824 eggs per female. The combined yield was 3,940,603 eyed eggs from 4,227,490 green eggs (93.2% eye-up), taken from 1,053 females. Overall fecundity was 3,742 eggs per female. These eggs were left to continue incubation and rearing at Rapid River Hatchery.

The eggs that remained after culling were shocked at 500 DTUs (Daily Temperature Units) by pouring them from the trays into water and back into trays. They were picked two days later using the salt bath method. At this time a Jensorter egg counter was used to establish inventory numbers. The eggs were returned to clean trays at a rate of two females per tray (10,000 eggs/tray maximum). After primary picking and enumeration another 712,614 eggs and sac fry were culled, and 125,734 eyed eggs were transferred (see Distribution). At 1,000 DTUs when most of the eyed eggs had hatched the trays were picked again. Second and third picking removed 33,023. This left an inventory of 3,069,232 to start brood year 1993 (based on a Jensorter count). All trays were "rodged" weekly, after eye-up, to remove silt. Three days each week, formalin was administered to each incubator stack at a rate of 1,667 ppm (1:600) for 15 minutes to retard external mycosis. This procedure was discontinued after each egg "Lot" accumulated 800 DTUs. Mycosis was successfully controlled. Fry were ponded at approximately 1,800 DTUs with a survival to swim-up of 87.3% (Appendix 26).

### **Early Rearing**

During the period from January 3 through March 13, 1994, fry were moved from the incubation trays to seven outdoor raceways. The average size at transfer was 0.31 g (1,463 fish/lb). Average initial loading density was 476,562 fish per raceway yielding an average density index of 0.24. Initial water depth was 1.5 ft and water flow was adjusted to 270 gpm. As the fish increased in size, water depth and flows were increased to a maximum depth of 3 ft and flow of 850 gpm. Density and flow indices (Piper, et.al., 1982) were maintained below 0.3 and 1.0, respectively, throughout the initial rearing period. The fry increased in size to an average length of 64.5 mm and weight of 2.33 g (194.2 fish/lb) during early rearing. Mortality during early rearing from ponding through May 31 was 35,328 fish or 1.1%.

At the end of the early rearing period, the fish were marked (see Fish Marking) and transferred to rearing ponds. Immediately prior to marking, all 1993 brood year fingerlings were fed 4.5% Gallimycin-50, at a rate to provide a dose of 100 mg Erythromycin per kilogram body weight, per day, for 21 days. This treatment was followed by appropriate toxicity testing and was performed according to guidelines set forth in INAD number 4333.

## **Final Rearing**

Rearing ponds were disinfected with a 200 ppm chlorine bath prior to ponding fish. As in the past, hatchery inventory numbers were adjusted by actual count obtained as fish were marked and transferred into the final rearing ponds. The fingerlings were transferred from raceways to ponds through four-inch metal irrigation pipe. The marking crew reported a total of 3,300,696 spring chinook were marked and moved from May 11 through June 3, 1993. This is an increase of five percent over hatchery inventory. This number is used for inventory for the final rearing period. Initial pond loading densities are reported in Appendix 19. Fingerlings were ponded at a mean length of 64.5 mm and increased to 138.7 mm at release. Final rearing densities prior to the initiation of volitional release on March 16, 1995 are shown in Appendix 20.

After marking and transfer to rearing ponds, all brood year 1993 fingerlings were fed 2.0% TM-100 at a rate to provide a dose of 100 mg Terramycin per kilogram body weight, per day, for 21 days. In addition to this prophylactic antibiotic treatment, they were fed Erythromycin again during August 1994. This final treatment consisted of 2.25% Aquamycin at a rate to provide 100 mg per kilogram body weight of Erythromycin, per day, for 21 days. This treatment was performed in accordance with INAD number 4333.

During the final rearing period, a feed test was performed to evaluate the relative performance of dry feed when fed to chinook salmon juveniles. BioDry 1000 feed was selected for this trial. The dry feed was fed at the same rate (adjusted for dry matter) as the BioMoist Feed normally fed at this stage of development at this hatchery. Qualitatively there was no difference in growth or fish health between the two groups. Statistics were not performed during this study due to limitations in experimental design. For more information regarding this study see "Feed Study Experiment (July 9 to October 9, 1994) Rapid River Hatchery" By Michele Baer, IDFG.

## **Feed Use and Conversion Data**

A total of 16,782 lbs of feed were fed during the initial rearing period with a feed conversion of 1.16. A total of 233,669 lbs of feed were fed during the final rearing period with a feed conversion of 1.47 lbs of feed for each pound increase in biomass. A total of 250,451 lbs of BioProducts feed was used for 1993 brood year fish prior to the beginning of volitional release on March 16. The overall feed conversion for 1993 brood year spring chinook was 1.45. This number is based on inventory and fish size on March 15. Between March 16 and egress of the last fish on April 12, another 14,930 lbs were fed to maintain vigor and visceral fat. This yields 265,381 lbs total feed, however conversion based on this number would be meaningless due to lack of specific inventory information for the period between March 16 and April 12. We feel that the value of volitional release far exceeds the need for increased precision of conversion data. Specific data on feed types and sizes used are listed in Appendix 21.

## **Fish Health**

### **Diseases Encountered and Treatment**

This part of the 1993 Brood Year Report is reproduced with permission from written communication with Mr. Doug Munson of the IDFG at the Eagle Fish Health Laboratory in Eagle Idaho. The summary of the preliberation inspection was reduced from the routine Fish Health Inspection Report for March 22, 1995 accession number 95-115. A summary of IDFG Health Laboratory results for inspections of brood year 1993 brood stock and juveniles is shown in Appendix 23.

Rapid River had one of their best years as far as fish health. "Fuzzy-tail" which has been a perennial problem at this hatchery, was virtually non-existent. Pooled kidney samples, examined via ELISA methods, had three of four pools positive for *Renibacterium* (all low titers) for preliberation samples. No fish were found to be positive for *Renibacterium* via DFAT. This is one of the best years for *Renibacterium*. *Flexibacter psychrophilus* was not found in routine examinations during random inspection sampling.

Erythrocytic Inclusion Body Syndrome (EIBS) was found at the Rapid River hatchery this year. Approximately seventy percent of the fish examined were positive for the virus. Anemia was associated with this infection. No mortality could be attributed to this infection.

*Myxobolus* was found, but a histopathology back-up was not collected. Thus *M. cerebralis* was not confirmed at this facility.

### **Preliberation Inspection**

Twenty fish were sampled on March 22, 1995. The results of this preliberation inspection were:

1. 3/4 pools positive for BKD (ELISA)- All pools low optical density and all pools negative via DFAT.
2. 3/4 pools positive for *Myxobolus*. No histological back-up samples are available at this time. Additional tests on adult and juvenile hatchery fish, and wild stock are recommended.
3. 0/20 fish positive for IHN
4. 0/20 fish positive for IPN. In addition to the inspection results from this sample a table of Organosomatic indices is provided in Appendix 22 (Goede, R.W., and S. Houghton. 1987)

### **Acute Losses**

Acute losses were not experienced at Rapid River this year.

### **Other Assessments**

Rapid River Hatchery has had an exceptional year in controlling etiologic agents. "Fuzzy-tail" has been the bane of Rapid River Hatchery for several years. A high run-off, with heavy sediment loads, have been implicated with this external mycosis. EIBS has also been associated with this disease. In other Fish Health Sections for Rapid River, the amount of *Renibacterium* and *Flexibacter* have also been associated with the onset of the external mycosis. At present, I feel that EIBS has little or nothing to do with "Fuzzy-tail", but still remains a concern because of the morbidity it produces (anemia). The hatchery staff and I agree the "Fuzzy-tail" will be a major source of mortality if the fish are fin clipped during high run-off with heavy sediment loads, if there is no BKD culling program. This years group of fish was clipped during clear water conditions after a culling program removed all the high and moderate BKD egg lots. In coming years, it is highly suggested to maintain a BKD segregation program and coordinate marking (as best as possible) to avoid high "dirty" water. From these management decisions we will minimize the losses to all etiologic agents at this facility.

In future years, a BKD culling or a segregation program should be implemented to maintain fundamental fish health conditions. Fish should also be fin clipped when water conditions are optimal (concerning sediment load and temperature). The water source to this hatchery needs to be cleaned up or changed. Finally, the Rapid River crew should be applauded and receive what kudos are due for their exceptional efforts in producing these fish.

In addition to IDFG, inspection federal personnel from the U.S. Department of the Interior, National Biological Survey sampled 60 fish at Rapid River Hatchery on March 29, 1995 for analysis by the Columbia River Research Laboratory (CRRL) in Cook, Washington. For more information on the results of their studies contact Mr. Philip Haner or Mr. Scott Vanderkoo at CRRL, Cook Washington.

### **Fish Marking**

Fish marking protocol requires the adipose fin to be removed from all brood year 1993 hatchery reared salmon. The marking crew reported a total of 3,300,696 fish were adipose clipped. Coded-wire tags were placed in 515,679 fingerlings. Marking continued from May 11, to June 3, 1994. PIT tags were placed in 2,488 fish during February of 1995. As part of this study, 990 fish were hand injected with PIT tags, and 999 were marked with mechanically injected PIT tags to assess accuracy of machine injection. These fish were released into Rapid River on March 31, 1995. PIT tags were also placed in 499 fish that were released into the Snake River below Hells Canyon Dam on March 30. Specific marking information is presented in Appendix 24. For more information regarding marking consult the Annual Release Summary Of Marked Salmon And Steelhead published by IDFG.

### **Fish Distribution**

#### **Egg Transfers**

During 1993, 2,401,107 green eggs from 568 females were transferred to Clearwater Hatchery immediately after water hardening. Of these, 224,950 eggs from 55 females were culled yielding 1,842,458 eyed eggs from 2,176,157 green eggs for an eye-up of 84.7% and fecundity of 4,242 eggs per female for 513 females. These were incubated at Clearwater Fish Hatchery and used to supplement their program.

On October 19, 1993, 125,734 eyed eggs were transferred to Sawtooth Hatchery as part of an agreement with the Shoshone-Bannock Tribes. From this shipment the surviving 101,950 fry were returned to Rapid River Hatchery on April 14, 1994. At that time, the fry averaged 1.19 g or 380 fish/lb. These fry were isolated and observed for 41 days then returned to the general population for secondary rearing. During the isolation period they were included in the antibiotic treatment under INAD 4333.

#### **Fingerling Transfers**

No brood year 1992 fingerlings were transferred.

#### **Smolt Releases**

The total release of brood year 1993 spring chinook from Rapid River Hatchery was 3,286,455 fish (175,407 pounds). Survival from swim-up to release was 999.6%8.5%. All releases took place from March 16 through April 12, 1995. The total cost reported by IPC for Rapid River Hatchery operation (including internal IPC costs) from September 1, 1993, to March 31, 1996 was \$1,048,614.36. If this cost is applied only to brood year 1993 smolts, it comes to \$5.98/lb of fish released (Appendix 27).

Volitional smolt releases from Rapid River Hatchery began on March 16, 1995 when approval was granted by the National Marine Fisheries Service (NMFS). Smolts averaged 24.4 g (18.6 fish/lb) and 139 mm

fork length. Rearing densities for smolts at time of release are listed in Appendix 20. Based on visual observations, it is estimated that over 90% of the smolts migrated volitionally. The remaining few fish were netted from the ponds as the ponds were dewatered. The last fish emigrated on April 12. Release data is reported in Appendix 25.

There were 2,786,919 (149,377 lbs) spring chinook smolts released to Rapid River at an average of 24.5 g (18.5 fish/lb) and 139 mm fork length. Spring chinook in the rearing ponds were fed throughout volitional release.

IPC personnel transported 499,536 (26,030 lbs) of Rapid River spring chinook smolts to Hells Canyon. These fish were released into the Snake River directly below Hells Canyon Dam from March 28 to 30, 1995. They averaged 23.7 g (19.1 fish/lb) and 137 mm fork length. The average hauling density was 0.97 lb/gal and the maximum density on the heaviest of the six loads was 1.14 lbs/gal. Tank compartments were oxygenated at a rate of five liters of oxygen per minute per compartment. The transport time was about five hours and all smolts arrived in good condition. Hauling mortality was less than 0.01%.

## **ACKNOWLEDGEMENTS**

The crew at Rapid River Hatchery would like to thank Paul Abbott and the entire fisheries staff at IPC for their support and assistance in helping us to maintain and improve the hatchery facility. We would also like to thank personnel from other IDFG hatcheries who helped us take eggs during the spawning season. Our gratitude goes to Roy Kinner and other IDFG conservation officers for helping with enforcement at the hatchery and for security at the trapping facility. In addition, we extend our appreciation to Doug Munson and the Eagle Fish Health Lab staff for disease diagnostic work at the hatchery, and assistance with preparation of this document. This team effort helps to keep Rapid River a successful hatchery.



## **LITERATURE CITED**

- Goede, R. W., and S. Houghton. 1987. ASUM A Computer Program For The Autopsy-Based Fish Health/Condition Assessment System. Utah Division of Wildlife Resources Fisheries Experiment Station, 1465 West 200 North, Logan, Utah 84321.
- Piper, P. G., I. B. McElwain, L. E. Orme, J.P. McCraren, J.R. Leonard. 1982. Fish Hatchery Management. United States Department of the Interior Fish and Wildlife Service. Washington D. C.

## **APPENDICES**

**Appendix 1. Rapid River Hatchery production capacity.**

Rearing unit	Volume		Carrying capacity	
Incubators	800	trays	3,200,000	eggs
Raceways (12)	1,890	cubic ft	3,800,000	fry
Rearing Pond #1	157,600	cubic ft	1,000,000	smolts
Rearing Pond #2	82,000	cubic ft	2,000,000	smolts
Adult Pond #1	12,000	cubic ft	1,000	adults
Adult Pond #2	24,000	cubic ft	3,000	adults
Adult Pond #3	80,000	cubic ft	6,000	adults

**Appendix 2. Rapid River Hatchery Pond volume.**

Rearing/Holding Area	Volume (cubic ft)
Rearing Pond #1A	28,000
Rearing Pond #1B	28,800
Rearing Pond #2A	21,700
Rearing Pond #2B	19,300
Rearing Pond #2C	19,300
Rearing Pond #2D	21,700
Adult Holding Pond #1	12,000
Adult Holding Pond #2	24,000
Adult Holding Pond #3	80,000

**Appendix 3. Rapid River water quality analysis, 1991.**

Parameter	Observed level	
Alkalinity	66.0	mg/L
Hardness	69.0	mg/L
Arsenic	<0.005	mg/L
Copper	<0.01	mg/L
Lead	<0.10	mg/L
Mercury	<0.0005	mg/L

**Appendix 4. Run timing, Rapid River spring chinook, 1993.**

Week ending		Number of fish	Percentage of total run
May	15	8	0.2
May	22	0	0.0
May	29	28	0.6
June	5	12	0.3
June	12	211	4.7
June	19	716	16.0
June	26	1689	37.8
July	3	1340	30.0
July	10	325	7.3
July	17	55	1.2
July	24	21	0.5
July	31	31	0.7
Aug	7	21	0.5
Aug	14	7	0.2
Aug	21	4	0.1
Aug	28	0	0.0
Total		4468	100.0

**Appendix 5. Length frequency, Rapid River spring chinook, 1993.**

Fork Length (cm.)	Number of fish	Fork Length (cm.)	Number of fish
less than 40	0	80	116
40	0	81	173
41	0	82	204
42	4	83	216
43	2	84	203
44	0	85	238
45	2	86	192
46	2	87	163
47	1	88	145
48	0	89	112
49	2	90	75
50	2	91	60
51	0	92	37
52	1	<u>Greater than 92</u>	<u>87</u>
53	1		
54	4	Run Total	4,468
55	3		
56	1	<u>Sex composition data</u>	
57	2	17. ( 0.38%) Jacks	
58	5	2,001. ( 44.79%) Males	
59	4	<u>2,450. ( 54.83%) Females</u>	
60	4	4,468. (100.00%) Total	
61	9		
62	18	<u>Chinook Age Class Data</u>	
63	26	17. ( 0.38%) Three Year Olds	
64	35	2,546. (56.98%) Four Year Olds	
65	42	<u>1,905. (46.64%) Five Year Olds</u>	
66	68	4,468. (100.00%) Run Total	
67	96		
68	103	<u>Age Determination Criteria</u>	
69	192	0 - 53 cm = Three Year Old	
70	192	54 - 80 cm = Four Year Old	
71	234	81 - > cm = Five Year Old	
72	271		
73	252		
74	207		
75	176		
76	132		
77	126		
78	130		
79	98		

## Appendix 6. Tagged adult recapture, 1993.

Recapture date	Species	Fork length (cm)	Jaw tag number	Transmitter		Comments
				CH	Code	
4- 9	Wild steelhead	76	2952	19	029	Jaw erosion from tag
4-21	Wild steelhead	77	B0868	17	004	Jaw tag not recovered
4-28	Wild steelhead	86	1850			No radio
5-26	Wild steelhead	74	D2684			No radio
6-16	spr. chinook	68	ZZ8	4	17	U I
6-21	spr. chinook	82	EF5	13	09	NMFS
6-22	spr. chinook	73	DU8	12	61	NMFS
6-22	spr. chinook	67	FJ1	7	05	NMFS
6-23	spr. chinook	86	YM6	2	14	U I, callus over eye tag
6-23	spr. chinook	85	DD5	3	11	U I
6-23	spr. chinook	66	D20	2	41	U I
6-23	spr. chinook	81	FF3	11	01	NMFS
6-28	spr. chinook	71	DH1	13	11	NMFS
6-29	spr. chinook	?	?	08	02	NMFS, disgorged
6-29	spr. chinook	85	HL3	05	86	U I
6-29	spr. chinook	86	DN2	6	33	U I
6-29	spr. chinook	88	HJ2	11	34	NMFS
6-30	spr. chinook	65	DA5	3	22	U I
6-30	spr. chinook	82	none	1	21	U I
7- 1	spr. chinook	89	HFG	6	62	U I
7- 2	spr. chinook	77	D33	3	53	U I
7- 4	spr. chinook	94	none	1	01	NMFS
7- 6	spr. chinook	78	G24708			NMFS, no radio, Jaw eroded
7- 6	spr. chinook	NA	none	10	17	NMFS
7- 6	spr. chinook	NA	D34	4	53	U I
7-21	spr. chinook	84	FK6	07	12	NMFS
7-29	spr. chinook	83	G24702			NMFS, no radio
8- 3	sum. chinook	85	DDH	2	13	U I
8- 5	unknown	?	G24707			NMFS, tag found in trap
8- 9	sum. chinook	80	DU9	unknown		U I, left in fish A/P UI
8-17	sum. chinook	82	DJ2	unknown		left in fish, released to Rapid River Drainage

In addition to the marks listed above, 501 adipose clips were observed, snouts collected, and sent to the IDFG Fish Marking Laboratory in Lewiston, Idaho.

**Appendix 7. Injuries to Chinook returning to Rapid River Hatchery, 1993.**

Strain	Gaff wound	Nitrogen blisters	Gill net	Other injuries
Spring	98	613	189	328
Summer	1	12	3	5

**Appendix 8. Run timing, Rapid River summer chinook, 1993.**

Week ending		Number of fish	Percentage of total run
July	3	1	0.1
July	10	38	5.5
July	17	93	13.4
July	24	174	25.1
July	31	178	25.6
Aug	7	118	17.0
Aug	14	73	10.5
Aug	21	13	1.9
Aug	28	6	0.9
Total		694	100.0

## Appendix 9. Length frequency, Rapid River summer chinook, 1993.

Fork Length (cm.)	Number of fish	Fork Length (cm.)	Number of fish
Less than 40	0	80	25
40	1	81	20
41	1	82	32
42	0	83	39
43	0	84	49
44	0	85	37
45	0	86	43
46	1	87	26
47	0	88	24
48	0	89	21
49	0	90	16
50	0	91	6
51	0	92	3
52	0	<u>Greater than 92</u>	<u>17</u>
53	1		
54	1	Run Total	694
55	1		
56	2		
57	0	<u>Sex composition data</u>	
58	0		
59	3	4. ( 0.58%) Jacks	
60	1	330. (47.55%) Males	
61	1	<u>360. (51.87%) Females</u>	
62	4	694. (100.00%) Total	
63	5		
64	4	<u>Chinook Age Class Data</u>	
65	7		
66	7		
67	12	4. ( 0.58%) Three Year Olds	
68	21	255. (36.74%) Four Year Olds	
69	24	<u>435. (62.68%) Five Year Olds</u>	
70	26	694. (100.00%) Run Total	
71	26		
72	30		
73	33	<u>Age Determination Criteria</u>	
74	29		
75	17	0 - 53 cm = Three Year Old	
76	19	54 - 80 cm = Four Year Old	
77	15	81 - > cm = Five Year Old	
78	17		
79	28		



**Appendix 10. Run timing, Rapid River steelhead, 1993.**

Week ending		Number of fish	Percentage of total run
Apr	3	3	1.5
Apr	10	23	11.4
Apr	17	21	10.4
Apr	24	26	12.9
May	1	26	12.9
May	8	26	12.9
May	15	52	25.7
May	22	0	0.0
May	29	18	8.9
Jun	5	0	0.0
Jun	12	0	0.0
Jun	19	2	1.0
Jun	26	2	1.0
Jul	3	1	0.0
Jul	10	2	0.0
Jul	17	0	0.0
Jul	24	0	0.0
Jul	31	0	0.0
Total		202	100.0

## Appendix 11. Length frequency, Rapid River Hatchery steelhead, 1993.

Fork Length (cm)	Hatchery		Wild		Total
	Male	Female	Male	Female	
45	0	0	0	0	0
46	0	0	0	0	0
47	0	0	0	0	0
48	0	0	0	0	0
49	0	0	0	0	0
50	0	0	0	0	0
51	0	0	0	0	0
52	0	1	0	0	1
53	1	0	0	0	1
54	2	2	1	0	5
55	1	0	1	0	2
56	2	1	1	0	4
57	4	1	0	4	9
58	2	1	2	3	8
59	2	0	2	5	9
60	2	0	5	3	10
61	2	0	2	2	6
62	0	0	1	0	1
63	0		0	3	4
64	1		4	0	6
65	0		2	1	5
66	0		0	0	3
67	0		4	4	8
68	0		0	3	4
69	0		1	5	6
70	0		1	5	6
71	0		1	5	7
72	1		0	5	6
73	0		0	8	8
74	1		2	8	11
75	2		1	7	10
76	1		0	6	7
77	0		1	10	11
78	0		0	5	5
79	1		1	6	8
80	0		0	5	5
81	0		2	6	8
82	0		1	3	4
83	0		2	2	4
84	0			1	3
85	0		3	0	3
86	0		2	1	3
87	0		0	0	0
88	0		0	0	0
89	0		1	0	1
<b>TOTAL</b>	<b>25</b>		<b>46</b>	<b>116</b>	<b>202</b>

**Appendix 12. Run timing, Rapid River Hatchery bull trout, 1993.**

Week ending		Number of fish	Percentage of total run
May	1	0	0.0
May	8	0	0.0
May	15	3	2.0
May	22	0	0.0
May	29	1	0.6
Jun	5	0	0.0
Jun	12	0	0.0
Jun	19	14	9.5
Jun	26	33	22.3
Jul	3	38	25.6
Jul	10	23	15.5
Jul	17	17	11.5
Jul	24	6	4.1
Jul	31	6	4.1
Aug	7	5	3.6
Aug	14	1	0.6
Aug	21	1	0.6
Aug	28	0	0.0
Total		148	100.0

**Appendix 13. Length frequency, Rapid River Hatchery bull trout, 1993.**

Total Length (cm)	Number of fish	Total Length (cm)	Number of Fish
21	1	41	4
22	0	42	7
23	0	43	8
24	1	44	11
25	0	45	10
26	0	46	8
27	0	47	8
28	0	48	7
29	0	49	3
30	1	50	1
31	0	51	2
32	2	52	3
33	3	53	2
34	4	54	0
35	9	55	1
36	7	56	1
37	13	57	0
38	11	58	0
39	9	59	1
40	10	60	0
Total			148

**Appendix 14. Major causes of pre-spawning adult mortality Rapid River Hatchery, 1993.**

Cause	Rapid River		Hells Canyon	
	# Fish	Percentage	# Fish	Percentage
Unknown	643	68.7	50	58.8
BAD	59	6.3	0	0.0
Jaundice	6	.6	5	9.8
Fungus	175	18.7	8	15.7
Other	53	5.7	8	15.7
Descaled	0	0.0	0	0.0
Total	936	100.0	71	100.0

**Appendix 15. Average monthly holding pond temperature (°F), Rapid River Hatchery 1993.**

Month	Maximum	Minimum	Average
Apr	50	40	44.4
May	58	41	47.2
Jun	57	44	49.0
Jul	58	44	52.4
Aug	61	49	55.3
Sep	60	42	51.2

**Appendix 16. Rapid River Hatchery egg enumeration data 1993.**

Eggs eyed at Rapid River Hatchery

Lot					Average	Females
#	# Eyed	# Bad	# Green	% Eyed	fecundity	kept
R1 <sup>a</sup>	5,843	5,000	10,843	53.9	5,422	2
R2	33,925	6,842	40,767	83.2	2,912	14
R3	80,617	7,970	88,587	91.0	4,429	20
R4	93,522	8,588	102,110	91.6	4,641	22
H1	7,672	678	8,350	91.9	4,175	2
R5	357,898	23,195	381,066	3.9	4,380	87
R6	543,556	20,517	564,073	96.4	4,148	136
R7	263,101	10,282	273,383	96.2	4,206	65
R8	195,491	8,129	204,120	96.0	3,925	52
H2	77,943	4,070	82,013	95.0	4,316	19
R9	491,380	31,499	522,579	94.0	4,083	128
R10	407,839	29,978	437,817	93.2	3,841	114
H3	143,480	8,158	151,630	94.6	4,098	37
R11	115,228	6,235	121,463	94.9	3,681	33
R15 <sup>b</sup>	73,827	14,539	88,366	83.5	3,682	24
H6 <sup>b</sup>	51,907	10,648	62,555	83.0	4,170	15
R16	4,407	870	5,277	83.5	5,277	1
H7	22,855	8,304	31,159	73.3	4,451	7
H8	4,400	7,565	11,965	36.8	3,988	3
Total	2,968,548	213,067	3,188,123	93.1	4,082	781
Culled <sup>c</sup>			414,720			108
Total			3,629,843			889

## Appendix 16. Rapid River Hatchery egg enumeration data 1993, continued

### Eggs eyed at Oxbow Hatchery and returned to Rapid River Hatchery

Lot #	# Eyed	# Bad	# Green	% Eyed	Average fecundity	Females kept
R11	349,396	15,547	364,943	95.7	3,686	99
R12	168,958	13,545	182,503	92.6	4,056	45
H4	139,971	11,361	151,332	92.5	4,090	37
R13	313,730	27,424	341,254	91.9	3,750	91
Total	972,055	67,877	1,040,032	93.5	3,824	272
Culled <sup>c</sup>			32,720			8
Total			1,072,752			280

### Eggs transferred to Clearwater Hatchery

Lot #	# Eyed	# Bad	# Green	% Eyed	Average Fecundity	Females kept
X1	54,336	31,211	85,547	63.5	4,502	19
X2	335,579	90,367	425,946	78.8	4,217	101
X3	429,150	39,159	468,309	91.6	4,257	110
X4	497,385	48,079	545,464	91.2	4,329	125
X5	182,726	18,092	200,818	91.0	4,564	46
X6	343,282	106,791	450,073	76.3	4,019	112
Total	1,842,458	333,699	2,176,157	84.7	4,242	513
Culled <sup>c</sup>			224,950			55
Total			2,401,107			568

### Hatchery total

Total	5,783,061	614,643	6,404,312	90.3	4,090	1566
Culled <sup>c</sup>			699,390			171
Total <sup>d</sup>			7,103,037			1737

<sup>a</sup>Lot R1 discarded due to high mortality at hatch.

<sup>b</sup>Lots R15 and H6 transferred to Sawtooth Hatchery.

<sup>c</sup>Culled prior to counting.

<sup>d</sup>The total number of eggs retained for rearing at Rapid River after primary pick and transfer of 125,734 eggs to Sawtooth Hatchery was 3,814,869. Secondary pick and a secondary cull of 712,614 sac fry and eggs yielded 3,058,676 eggs and fry to start broodyear 1993. In addition to the eggs enumerated above, an additional 280 females were released. They represent another potential 1,145,200 eggs (assuming average fecundity of 4,090). Adding this total to the total egg take yields 8,248,902 eggs returned to Rapid River and Hells Canyon Hatcheries in 1993 (not including prespawning mortality of 582 females).

**Appendix 17. ELISA results, spring chinook broodstock, 1993.**

Lot number	Date sampled	Number sampled	Negative	Positive		
			<.099	Low .1-.25	Moderate .26-.59	High >.6
R1	8/ 6	2			not sampled	
R2	8/16	19	13	4	0	2
R3	8/19	70	29	23	5	13
R4	8/20	30	6	15	1	8
R5	8/23	94	15	52	19	8
R6	8/24	291	79	122	42	48
R7	8/25	70	39	21	6	4
R8	8/26	52	49	3	0	0
R9	8/27	264	185	46	8	25
R10	8/30	122	103	11	1	7
R11	8/31	273	201	50	11	11
R12	9/ 1	45	27	16	2	0
R13	9/ 3	139	90	41	4	4
R14	9/ 7	91	63	24	1	3
R15	9/10	33	3	20	5	5
R16	9/14	3	7	0	0	0
H1	8/20	2	2	0	0	0
H2	8/26	20	19	0	0	1
H3	8/30	37	37	0	0	0
H4	9/ 2	37	34	2	1	0
H5	9/ 7	28	27	0	0	1
H6	9/10	16	14	1	0	1
H7	9/14	1	0	1	0	0
H8	9/17	7	3	0	0	0
Total		1,741	1,042	452	106	141

Percent of samples with high positive results are 8.6% for Rapid River, and 2.1% for Hells Canyon

**Appendix 18. Species trapped in Rapid River, 1993 Rapid River Hatchery.**

Species	Number trapped
Spring chinook	4,468
Summer chinook	694
Steelhead	202
Bull trout	148

**Appendix 19. Initial pond loading densities, June 1994 Rapid River Hatchery.**

Pond	Inflow (cfs)	Number of fish	Fish per pound	Density Flow index	index
Pond 1A	6.84	637,721	222.5	0.04	0.38
Pond 1B	7.62	621,121	184.9	0.05	0.38
Pond 2A	5.50	521,436	175.7	0.05	0.46
Pond 2B	5.50	485,810	195.0	0.05	0.37
Pond 2C	6.16	471,952	180.6	0.05	0.36
Pond 2D	6.16	562,656	208.6	0.05	0.40

**Appendix 20. Pond loading densities at release, March 1995 Rapid River Hatchery.**

Pond	Inflow (cfs)	Number of fish	Fish per pound	Density Flow index	index
Pond 1A	8.19	635,740	19.83	0.21	1.63
Pond 1B	8.59	619,131	18.47	0.21	1.58
Pond 2A	5.26	519,403	17.30	0.25	2.27
Pond 2B	5.26	483,560	19.07	0.23	1.88
Pond 2C	5.90	469,634	18.64	0.24	1.73
Pond 2D	5.90	558,805	18.54	0.25	2.09



**Appendix 21. Feed used, Rapid River Hatchery brood year 1993.**

Product		Amount	Unit used	Total Price
Type and size	Additive Cost			
<u>BioDiet:</u>				
No. 2	Starter	540.0 kg	1.8800	1,015.20
No. 3	Starter	920.0 kg	1.8800	1,729.60
1.0 mm Grower		100.0 kg	1.5200	152.00
1.3 mm Grower		2.0% TM-100 920.0 kg	1.4740	1,356.08
1.5 mm Grower		2.0% TM-100 800.0 kg	1.4740	1,179.20
<u>BioMoist:</u>				
1.0 mm Grower		1,200.0 lb	0.5300	636.00
1.0 mm Grower		4.5% Gallimycin-50 4,100.0 lb	0.9230	3,784.30
1.3 mm Grower		3,200.0 lb	0.5200	1,664.00
1.5 mm Grower		1,800.0 lb	0.5200	936.00
1.5 mm Grower		* EIBS vitamin pac 2,500.0 lb	0.6050	1,512.50
1.5 mm Grower		2.0% TM-100 9,000.0	0.6700	6,030.00
2.5 mm Feed		EIBS vitamin pac 30,000.0 lb	0.4500	13,500.00
2.5 mm Feed		2.25% Aquamycin-100 EIBS vitamin pac 25,000.0 lb	0.7763	19,407.50
3.0 mm Feed		EIBS vitamin pac 65,000.0 lb	0.4500	29,250.00
3.0 mm Feed		EIBS vitamin pac 101,350.0 lb	0.4750	48,141.25
<u>BioDry 1000:</u>				
1.5 mm		4,000.0 lb	0.3900	1,560.00
2.5 mm		850.0 lb	0.3500	297.50
2.5 mm		EIBS vitamin pac 10,150.0 lb	0.4350	4,415.25
TOTAL		265,381.0 lb		136,566.38

\* E.I.B.S. vitamin pac: 5 X C and B12, and 10 X Folic acid.

## Appendix 22. Preliberation organosomatic index, brood year 1993.

### Hematology

Date	Hematocrit			Serum protein		
	<sup>a</sup> Mean	<sup>b</sup> SD	<sup>c</sup> CF	<sup>a</sup> Mean	<sup>b</sup> SD	<sup>c</sup> CF
3/22/95	42.70	6.33	0.15	6.75	1.08	0.16

<sup>a</sup>20 fish pool

<sup>b</sup>Standard deviation

<sup>c</sup>Coefficient of variation

### Combined autopsy summary

Eyes	Gills	Pseudo- branches	Thymus	Mesen. fat	Spleen	Hind gut	Kidney	Liver	Bile
N 20	N 20	N 20	0 20	0 0	B 0	0 20	N 20	A 0	0 0
B1 0	F 0	S 0	1 0	1 0	R 11	1 0	S 0	B 20	1 0
B2 0	C 0	L 0	2 0	2 0	G 0	2 0	M 0	C 0	2 0
E1 0	M 0	S&L 0		3 0	NO 0		G 0	D 0	3 0
E2 0	P 0	I 0		4 20	E 9		U 0	E 0	4 0
H1 0	OT 0	OT 0			OT 0		OT 0	F 0	
H2 0								OT 0	
M1 0									
M2 0									
OT 0									

### Summary of normals

20	20	20	20	20	11	20	20	20	0
----	----	----	----	----	----	----	----	----	---

N= normal

F= frayed

OT= other

Thymus: 0= no hemorrhage

Mesenteric Fat: 0= none, 1= <50% coverage, 2= 50%, 3= >50%, 4= 100%

Spleen: R= red, E= enlarged (EIBS enlarges spleens)

Hind gut: 0= no inflammation

Liver: B= pale red

Bile: 0= yellow bile <full bladder

### Appendix 23. Eagle Lab inspection results for brood year 1993.

Stock	Log #	VH	VP	VE	BKD	FUR	ERM	CW	PW	Comments
<b><u>Juvenile samples</u></b>										
RAPDRV	94-072	-	-			-	-	-		DX:COAGULATED YOLK, EGD: VIRO 0/10,BACTE NSG
RAPDRV	94-114									IX: ENVIRONMENTAL GILL DISEASE, SOME COAGULATED YOLKD
RAPDRV	94-269	-	-		-					IX: NEGATIVE FOR PATHOGENS; FA 0/10,VIRO 0/10
RAPDRV	94-317				-	-	-	+		IX: F. PSYCHROPHILUS 1/8: FA 0/10,
RAPDRV	94-362	-	-		-	-	-	-		IX: NEGATIVE FOR PATHOGENS: VIRO 0/10, BACTE NSG 0/8, FA 0/10
RAPDRV	94-405			-	-					IX: NEAGTIVE FOR PATHOGENS; FA 1/10, EIBS 0/10
RAPDRV	94-493	-	-		-			+		IX: MAS, CWD; VIRO 0/6, BACTE: AEROMONA HYGROPHILA, F PSYCHROPHILUS
RAPDRV	94-600	-	-		-	-	-	-		IX: Negative for pathogens; VIRO 0- 10 FA 0/10, BACTE NSG
RAPDRV	94-656	-	-	+	+	-	-	-		IX: BKD, EIBS: VIRO 0/19, BACTE 0/19 FA 1/19, EIBS 13/19
<b><u>Brood stock samples</u></b>										
RRSC	93-332				+					IX: ELISA 1/2 MOD
RRSC	93-334				+					IX: ELISA 4/11 (3 LOW, 1 HIGH)
RRSC	93-364				+					IX: ELISA 24/30 (15 LOW, 1 MOD, 1 HIGH)
RRSC	93-365				+					IX: ELISA 79/94 (52 LOW, 19 MOD, 5 HIGH)
RRSC	93-366				+					IX: ELISA 6/19 (4 LOW, 0 MOD, 2 HIGH)
RRSC	93-367				-					IX: NEGATIVE FOR PATHOGENS, ELISA 0/2
RRSC	93-374				+					IX: RS; ELISA 3/52 (LOW)
RRSC	93-375				+					IX: BKD; ELISA 1/20 (HIGH)
RRSC	93-379				+					IX: BKD; ELISA 79/264 (25 HIGH)
RRSC	93-384				-					IX: NEGATIVE FOR PATHOGENS; ELISA 0/37
RRSC	93-385				+					IX: BKD; ELISA 19/22 (7 HIGH)

### Appendix 23. Eagle Lab inspection results at Rapid River Hatchery for brood year 1993, continued

Stock	Log #	VH	VP	VE	BKD	FUR	ERM	CW	PW	Comments
RRSC	93-368				+					XI: BKD; ELISA 6/9 (5 HIGH)
RRSC	93-369				+					XI: BKD; ELISA 206/282 (43 HIGH, 42 MOD, 121 LOW 76 N)
RRSC	93-370				+					XI: BKD; ELISA 31/69 (4 HIGH, 6 MOD, 21 LOW, 39 N)
RRSC	93-407				+					XI: BKD; ELISA 49/139 (41 LOW, 4 MOD, 4 HIGH)
RRSC	93-408				+					XI: BKD; ELISA 28/91 (24 LOW, 1 MOD, 3 HIGH)
RRSC	93-409				+					XI: BKD; ELISA 1/28 (1 HIGH)
RRSC	93-422				-					XI: NEGATIVE FOR PATHOGENS; ELISA 0/7
RRSC	93-423				+					XI: RS; ELISA 1/1 (LOW)
RRSC	93-424				+					XI: BKD; ELISA 2/16 (1 LOW, 0 MOD, 1 HIGH)
RRSC	93-425				+					XI: BKD; ELISA 30/33 (20 LOW, 5 MOD, 5 HIGH)
RRSC	93-351	+	-							XI: IHN, BKD; ELISA 41/70 (23 LOW, 5 MOD, 13 HIGH), VIRO 35/59
RRSC	93-391									XI: BKD; ELISA 72/273 (50 LOW, 11 MOD, 11 HIGH)
RRSC	93-395				+					XI: BKD; ELISA 18/45 (16 LOW, 2 MOD, 0 HIGH)
RRSC	93-406				+					XI: BKD; ELISA 3/37 (2 LOW, 1 MOD, 0 HIGH)
RRSC	93-531				-					XI: NEGATIVE FOR PATHOGENS; ELISA 0/3

## Appendix 24. Marking summary, brood year 1993.

### Coded wire tag releases

Release site	Date released	No. marked fish released	Release group mark code	Clip	Purpose	Pond	File number
Rapid River	3/16-4/12/95	104,503	10/49/16	LV	U.S. Canada Clip evaluation	1A	95RR-01
Total Group Release		104,503					
Rapid River	3/16-4/12/95	103,327	10/49/04	AD	U.S. Canada	1B	95RR-02
Rapid River	3/16-4/12/95	515,986	ad only	AD	Hatchery/Wild	1B	95RR-02
Rapid River	3/16-4/12/95	102,793	10/49/04	AD	U.S. Canada	2A	95RR-02
Rapid River	3/16-4/12/95	416,610	ad only	AD	Hatchery/Wild	2A	94RR-02
Rapid River	3/16-4/12/95	101,513	10/49/04	AD	U.S. Canada	2B	95RR-02
Rapid River	3/16-4/12/95	382,047	ad only	AD	Hatchery/Wild	2B	95RR-02
Rapid River	3/30-4/12/95	10,746	10/49/15	AD	U.S. Canada	2D	95RR-02
Rapid River	3/30-4/12/95	48,523	ad only	AD	Hatchery/Wild	2D	95RR-02
Total Group Release		1,681,545					
Rapid River	3/16-4/12/95	531,237	ad only	AD	Hatchery/Wild	1A	95RR-03
Rapid River	3/16-4/12/95	469,634	ad only	AD	Hatchery/Wild	2C	95RR-03
Total Group Release		1,000,871					
Site Release		2,786,919					
Hells Canyon	3/28-3/30/95	90,566	10/49/15	AD	U.S. Canada	2D	95RR-04
Hells Canyon	3/28-3/30/95	408,970	ad only	AD	Hatchery/Wild	2D	95RR-04
Site/Group Release		499,536					
Hatchery Release		3,286,455					

### Pit tag releases

Release site	Date released	No. marked fish released	Release group mark code	Clip	Pit tag file number
Rapid River	3/31/95	492	10/49/04 10/49/15 10/49/16 AD only	AD, LV	LRB95045.RA1
Rapid River	3/31/95	498	"	AD, LV	LRB95045.RA2
Rapid River	3/31/95	499	"	AD, LV	LRB95046.RA3
Rapid River	3/31/95	500	"	AD, LV	LRB95046.RA4
Hells Canyon	3/30/95	499	10/49/15 AD only	AD	DAC95046.RHC

Pit Tags released 2,485

## Appendix 25. Smolt releases, Rapid River Hatchery, 1995.

Release site Date	Release method	Number released	Number fish per pound
<b><u>Snake river</u></b>			
03/28-30/95	Tanker truck to Hells Canyon Dam	<u>499,536</u>	19.1
Release Site:	Number released	499,536	
	Pounds released	26,030	
<b><u>Rapid River</u></b>			
03/16-4/10/95	Volitional Release Pond 1A	626,240	19.8
03/16-4/10/95	Volitional Release Pond 1B	610,113	18.5
03/16-4/10/95	Volitional Release Pond 2A	506,503	17.3
03/16-4/10/95	Volitional Release Pond 2B	471,460	19.1
03/16-4/10/95	Volitional Release Pond 2C	<u>457,934</u>	18.6
Volitional Release Subtotal		2,672,250	
04/10-11/95	Smolts Flushed Pond 1A	9,500	19.8
04/10-11/95	Smolts Flushed Pond 1B	9,200	18.5
04/10-12/95	Smolts Flushed Pond 2A	12,900	17.3
04/10-12/95	Smolts Flushed Pond 2B	12,100	19.1
04/10-12/95	Smolts Flushed Pond 2C	11,700	18.6
04/10-12/95	Smolts Flushed Pond 2D	<u>59,269</u>	18.5
Pond Flush Subtotal		114,669	
Release Site	Number released	2,786,919	
	Pounds released	149,377	
Hatchery total	Number released	3,286,455	
	Pounds released	175,407	

## Appendix 26. Brood Year 1993 chinook survival from eggs to released smolts, Rapid River Hatchery.

<sup>a</sup> Green eggs number	Eyed eggs number	Percent survival	<sup>b</sup> Swim up	Percent survival	<sup>c</sup> Marked number	<sup>d</sup> Released smolts	<sup>e</sup> Percent survival
4,227,490	3,940,603	93.2	3,069,232	87.3	3,300,696	3,286,455	99.6

<sup>a</sup>Total egg take minus 2,401,107 to Clearwater Hatchery and 1° cull of 474,440.

<sup>b</sup>Number after transfer of 125,734 to Sawtooth Hatchery and 2° cull of 712,614.

<sup>c</sup>Includes 101,950 returned from Sawtooth Hatchery and was +5% counter inventory.

<sup>d</sup>Number released based on number reported marked minus mortality after marking.

<sup>e</sup>Percent from marking to release.

## Appendix 27. Rapid River Hatchery Brood Year 1993 cost of production.

Number of fish	Pounds of fish	Pounds of feed	Cost of feed	Feed conversion	Total cost	Cost per thousand	Cost per pound
3,286,455	175,407	265,381	\$136,566.38	1.51	\$1,048,614.36	319.07	\$5.98

\* Actual dollars spent from September 1, 1993 to March 31, 1995 weighted by percent of fish in brood year 1993 on station by mouth, minus capital outlay, plus transport cost.

## Appendix 28. Returns to Rapid River Hatchery, 1964-1994.

Return year	Snake R. return (adults)	Rapid R. return (adults)	Rapid R. return (jacks)	Percent prespawning mortality	Females spawned	Eggs/female	Number of eggs taken
1964	349			16	182	4,874	887,000
1965	408			21	133	4,541	604,000
1966	1,511			18	621	3,697	2,296,000
1967	974	1,039		11	581	3,537	2,055,000
1968	351	3,416	740	2	1,809	3,671	6,540,000
1969	672	2,817	1,043	8	1,415	3,655	5,151,697
1970		6,470	887	10	3,520	4,136	14,560,280
1971		3,357	1,754	19	1,722	3,507	6,038,785
1972		12,310	943	15	3,825	3,941	15,072,604
1973		17,054	286	37	3,454	3,912	13,510,465
1974		3,457	538	27	1,756	3,924	6,890,186
1975		4,428	573	7	2,184	3,894	8,503,606
1976		6,342	1,765	15	3,055	3,762	11,492,878
1977		7,767	437	11	3,781	3,745	14,160,330
1978		5,735	34	21	2,350	4,266	10,026,888
1979		3,054	350	31	1,141	4,950	5,648,722
1980		1,528	432	30	543	3,235	1,756,827
1981		3,087	176	7	1,666	3,675	6,122,273
1982		3,646	30	11	1,883	3,973	7,482,330
1983		1,864	94	15	859	4,015	3,449,471
1984		1,705	651	7	821	3,807	3,125,911
1985	673	6,376	351	8	2,962	3,741	*11,535,461
1986	360	6,546	177	34	2,451	4,355	*10,673,138
1987	534	3,808	210	30	1,133	4,379	* 5,656,145
1988	381	3,608	172	19	1,645	4,879	* 7,905,702
1989	86	2,372	428	11	1,082	4,139	* 4,478,045
1990		2,566	40	13	1,063	3,967	4,217,103
1991		1,675	238	10	657	3,886	2,553,218
1992	912	2,370	96	24	1,177	3,988	*4,534,404
1993	411	4,451	17	17	1,737	4,090	*6,404,312
1994	29	261	4	21	116	4,216	*489,060

\* Includes eggs taken from Hells Canyon adults.

## Appendix 29. Summary of returns to Rapid River Hatchery by brood year.

Brood year	Year released	Number Released	3-Year olds	Year returned	4-Year olds	Year returned	5-Year olds	Year returned	Return From release	% Return from release
1964	1966	588,000	1,309	1967	3422	1968	197	1969	4,658	0.80
1965	1967	479,267	740	1968	2,620	1969	874	1970	4,234	0.89
1966	1968	1,460,150	1,043	1969	5,596	1970	364	1971	7,003	0.48
1967	1969	900,192	887	1970	2,992	1971	1,544	1972	5,416	0.60
1968	1970	3,172,000	1,754	1971	10,766	1972	4,403	1973	16,923	0.53
1969	1971	2,718,720	943	1972	12,654	1973	1,759	1974	15,356	0.56
1970	1972	2,809,200	285	1973	1,698	1974	386	1975	2,370	0.08
1971	1973	2,908,425	538	1974	4,206	1975	1,120	1976	5,864	0.20
1972	1974	2,707,917	573	1975	5,222	1976	634	1977	6,429	0.24
1973	1975	3,373,700	1,765	1976	7,110	1977	1,845	1978	10,720	0.32
1974	1976	3,358,940	437	1977	3,890	1978	2,413	1979	6,740	0.20
1975	1977	2,921,172	34	1978	598	1979	46	1980	678	0.02
1976	1978	2,413,678	350	1979	1,482	1980	146	1981	1,978	0.08
1977	1979	2,866,993	432	1980	3,068	1981	557	1982	4,057	0.14
1978	1980	2,604,823	176	1981	3,089	1982	1,206	1983	4,291	0.16
1979	1981	2,372,607	30	1982	838	1983	356	1984	1,224	0.05
1980	1982	1,473,733	94	1983	1,349	1984	199	1985	1,642	0.11
1981	1983	2,998,103	651	1984	6,177	1985	1,456	1986	8,284	0.28
1982	1984	3,246,197	351	1985	5,090	1986	1,155	1987	6,596	0.20
1983	1985	2,491,238	177	1986	2,444	1987	1,557	1988	4,178	0.17
1984	1986	1,594,688	210	1987	2,051	1988	379	1989	2,640	0.17
1985	1987	2,836,400	172	1988	1,933	1989	135	1990	2,300	0.08
1986	1988	2,630,200	428	1989	2,431	1990	421	1991	3,280	0.12
1987	1989	2,319,500	40	1990	1,254	1991	161	1992	1,455	0.06
1988	1990	2,520,400	238	1991	2,209	1992	1,905	1993	4,352	0.17
1989	1991	2,564,900	96	1992	2,546	1993	122	1994	2764	0.11
1990	1992	2,615,500	17	1993	139	1994		1995		
1991	1993	2,060,300	4	1994		1995		1996		
1992	1994	2,547,642		1995		1996		1997		
1993	1995	2,786,919		1996		1997		1998		
1994	1996			1997		1998		1999		

\*Lower Granite Dam Completed 1975.



**Appendix 30. Average feed and growth data for Rapid River Hatchery, 1980-1995.**

Month	Avg. water temp. (F)	Density index	Flow index	Feed <sup>a</sup> conv.	Hatchery Constant	Daily length increase	Monthly length increase	Condition factor	% body weight fed	Number feedings per day	Ave. #/Lb end of month	Ave. length end of month
FEB	38	N.A.	N.A.	N.A.	1.98	0.0024	0.07	0.00027	1.42	8	1109	1.50
MARCH	41	0.24	0.59	1.07	2.26	0.0070	0.20	0.00028	1.89	8	809	1.64
APRIL	44	0.29	0.64	1.02	3.23	0.0105	0.34	0.00031	2.40	8	439	1.95
MAY <sup>b</sup>	46	0.29	0.74	1.00	4.54	0.0151	0.29	0.00031	2.30	8	271	2.29
JUN	49	0.07	0.69	1.20	7.10	0.0297	0.59	0.00031	2.93	4	136	2.87
JULY	54	0.09	0.83	1.59	7.36	0.0155	0.47	0.00031	2.75	4	79	3.43
AUG	55	0.12	1.33	1.59	7.82	0.0164	0.50	0.00036	2.70	5	49	3.86
SEPT	51	0.15	1.57	1.70	8.66	0.0170	0.51	0.00035	2.00	5	36	4.31
OCT	46	0.16	1.69	1.71	5.03	0.0098	0.30	0.00035	1.37	3	30	4.60
NOV	41	0.17	1.81	2.22	1.54	0.0023	0.07	0.00035	0.41	2	28	4.67
DEC	38	0.17	1.88	4.46	2.12	0.0016	0.03	0.00034	0.21	1	30	4.67
JAN	37	0.18	1.89	2.83	1.15	0.0013	0.03	0.00034	0.21	1	29	4.69
FEB	38	0.18	2.01	1.24	1.47	0.0040	0.12	0.00032	0.53	2	26	4.95
MAR	41	0.19	1.94	1.55	3.47	0.0074	0.22	0.00032	0.92	2	22	5.19

<sup>a</sup>Feed conversion is expressed as actual feed weight over weight gain from January 1990-July 1995

<sup>b</sup>Growth data may vary during periods of high water.

# Appendix 31. Release and transfer summary for Rapid River Hatchery, 1964-1994.

Brood Year	No. eggs taken		Egg, Fry Plants & Site	Smolt Plants & Site	Fish/ pound
1964	887,000	None		588,000 Rapid River	22.6
1965	604,000	None		479,267 Rapid River	23.2
1966	2,296,000	None		1,460,150 Rapid River	25.0
1967	2,055,000	None		900,192 Rapid River	24.0
1968	6,540,000	757,376	eggs, Clearwater H Channel	3,172,000 Rapid River	20.0
1969	5,171,697	497,000	eggs, Dworshak NFH to start Kooskia NFH.	2,718,720 Rapid River	21.0
1970	14,560,280	4,417,454	eggs, Sweetwater Eye Stat.	2,809,200 Rapid River	19.4
		2,224	eggs, Kooskia NFH	91,800 Lochsa River	
		526,516	eggs, Hayden Ck. Hatchery		
		2,473,983	eggs, Clearwater H Channel		
		4,607,736	eggs, Rapid R. Hatchery		
		200,520	fry, Lemhi R.		
		353,970	fry, Decker Pond		
1971	6,038,785	600,000	eggs, Hayden Ck. Hatchery	2,908,425 Rapid River	17.0
		53,562	fry, Lemhi R.	197,303 SF Clearwater	
		104,300	fry, Red R.		
		29,800	fry, Ten Mi. Ck.		
		44,700	fry, American R.		
		14,900	fry, Papoose Ck.		
		59,600	fry, Brushy Ck.		
		44,700	fry, Fish Ck.		
		14,900	fry, Post Office Ck.		
		44,700	fry, Squaw Ck.(Lochsa)		
		61,500	fry, Lochsa R.		
		60,000	fry, Ten Mi. Ck.		
		200,880	fry, Sandpoint Hatchery		
		401,305	fry, Decker Pond		
1972	15,072,604	5,256,662	eggs, Sweetwater Eye Stat.	2,707,917 Rapid River	17.5
		3,012,358	eggs, Hayden Ck. Hatchery		
		1,293,592	eggs, Red R. H Chan		
1973	13,510,464	3,915,900	eggs, Sweetwater Eye Stat.	3,373,700 Rapid River	14.8
		1,295,424	eggs, Hayden Ck. Hatchery	117,000 SF Clearwater	
		104,760	eggs, Hagerman Hatchery		
		502,200	eggs, Crooked R. H Chan		
		702,000	eggs, Kooskia NFH		
		806,400	eggs, Hayden Ck. Hatchery		
		504,000	eggs, Minnesota-walleye trade		
		210,734	fry, Sandpoint Hatchery		
		206,360	fry, Kooskia Hatchery		
		88,480	fry, Ten Mi. Ck.		
		18,200	fry, Newsome Ck.		
		633,000	fry, Lemhi R.		
		10,428	fry, Capehorn Ck.		

**Appendix 31. Release and transfer summary for Rapid River Hatchery 1964-1994 continued.**

Brood Year	No. eggs taken			Egg, Fry Plants & Site	Smolt	Plants & Site	Fish/ pound
1974	6,890,186	809,400 407,012 203,500 21,840 59,962 30,750 10,250 1,140,300	eggs, eggs, fry, fry, fry, fry, fry, fry,	Hayden Ck. Hatchery Indian Ck. Sandpoint Hatchery Capehorn Ck. Red R. Newsome Ck. Ten Mi. Ck. Lemhi R.	3,358,940 205,700	Rapid River SF Clearwater	18.4
1975	8,503,606	2,363,200 252,200 255,000 280,659 4,906,492 34,000 156,000 65,960 412,800 209,950 36,143	eggs, eggs, eggs, eggs, eggs, fry, fry, fry, fry, fry, fry,	Sweetwater Eye Stat. Mullan Hatchery Hayden Ck. Hatchery Indian Ck. H Chan Rapid R. Hatchery Ten Mi. Ck. Lemhi R. SF Clearwater R. Decker Pond Sandpoint Hatchery Bear Valley Ck.	2,921,172 249,750	Rapid River SF Clearwater	15.9
1976	11,492,878	1,161,608 2,937,994 261,900 261,900 1,267,208 47,008 311,850 104,500 501,600 80,600	eggs, eggs, eggs, eggs, eggs, fry, fry, fry, fry, fry,	Mullan Hatchery Sweetwater Eye Stat. Hayden Ck. Hatchery Sandpoint Hatchery Mackay Hatchery Univ of Idaho, Fish Coop. Mackay Hatchery Lolo Ck. Red R. Pond SF Clearwater R.	2,413,678	Rapid River	15.7
1977	14,160,330	2,633,400 2,287,800 2,689,000 288,000 20,700 1,007,340 723,000 50,800 200,025 265,600	eggs, eggs, eggs, eggs, eggs, eggs, fry, fry, fry, fry,	Sweetwater Eye Stat. Kooskia NFH Mullan Hatchery Hayden Ck. Hatchery Univ of Idaho Crooked R. H Chan Mackay Hatchery Decker Pond Red R. Pond Lemhi R.	2,866,993 156,362 44,373	Rapid River White Sand Newsome Creek	15.0
1978	10,026,888	767,322 970,728 1,540,282 706,936 38,160 10,864 1,250,010 249,969 232,500 10,000	eggs, eggs, eggs, eggs, eggs, eggs, eggs, eggs, fry, fry,	Hayden Ck. Hatchery Mackay Hatchery Sweetwater Eye Stat. Dworshak NFH Univ of Idaho Univ of Idaho (Hayden Ck.) Crooked R. H Chan Sweetwater Eye Stat. Red R. Pond Ten Mi. Ck.	2,604,823 57,440	Rapid River White Sand	15.0

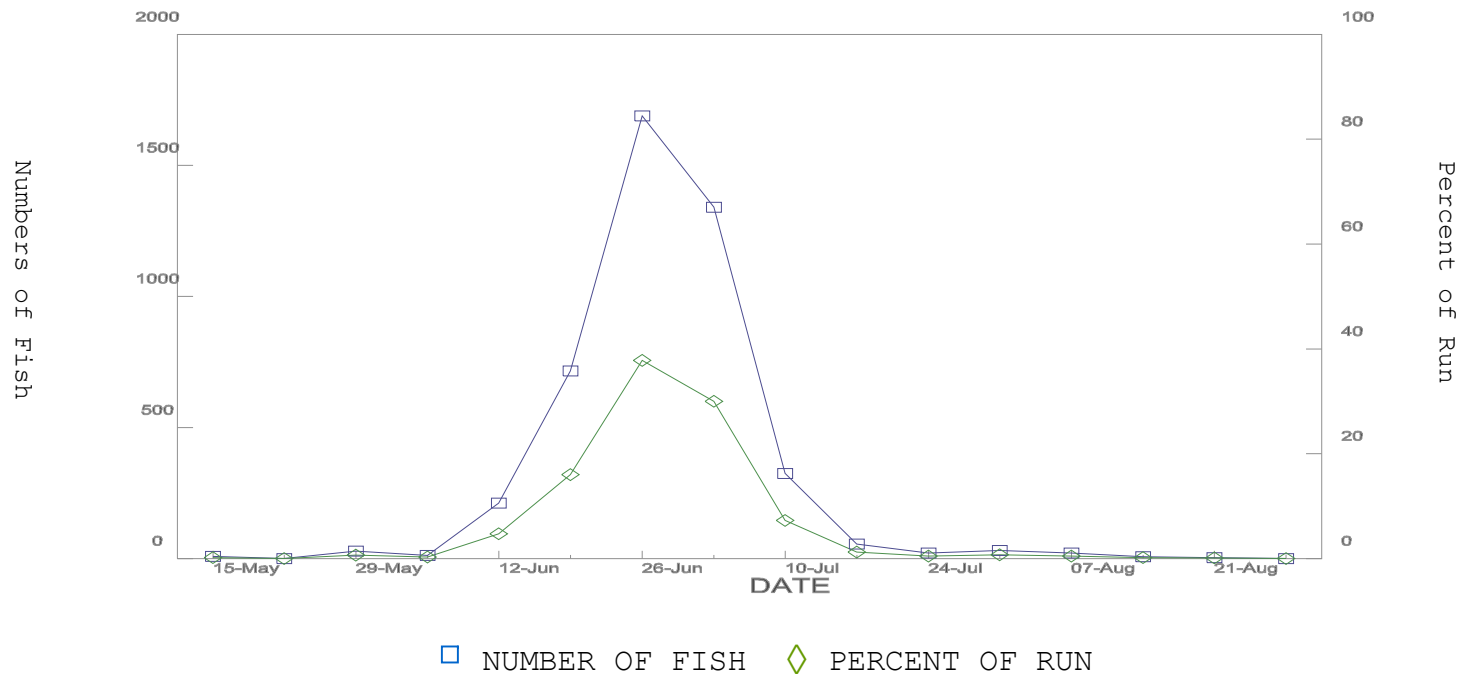
# Appendix 31. Release and transfer summary for Rapid River Hatchery (continued).

Brood Year	No. eggs taken		Egg, Fry Plants & Site	Smolt Plants & Site	Fish/ pound
1979	5,646,722	806,400 330,880 293,249	eggs, eggs, fry, Hayden Ck. Hatchery Dworshak NFH Red R. Pond	2,372,607 1,001,700	Rapid River Snake River 17.9 21.0
1980	1,756,827	None		1,473,733	Rapid River 28.0
1981	6,122,273	608,384 256,608 449,280	eggs, eggs, eggs, Pahsimeroi Hatchery Oxbow Hatchery Dworshak NFH	2,998,103 250,020	Rapid River Snake River 22.0 27.0
1982	7,420,450	493,346 1,332,000 375,028 125,055 306,000	eggs, eggs, eggs, eggs, fry, Looking Glass (Ore) Pahsimeroi Hatchery Dworshak NFH Hagerman NFH Red R. Pond	3,246,197 500,850	Rapid River Snake River 20.0 27.0
1983	3,449,471	None		2,491,238 437,360	Rapid River Snake River 23.0 27.0
1984	3,125,911	152,000	fry, Red River	1,594,688 140,000 136,800	Rapid River Snake River Red River 22.0 20.0 30.0
	217,181				
1985	11,535,461	497,520 3,668,000 2,450,907 100,590 349,650 200,158 55,123 144,443 70,282 49,437 102,282 115,352	eggs, eggs, eggs, fry, fry, fry, fry, fry, fry, fry, fry, fry, fry, Oregon Dworshak NFH Sawtooth Hatchery Boulder Ck. Crooked R. Eldorado Ck. Hopeful Ck. Crooked Fk. White Sands Ck. Ten Mi. Ck. Newsome Ck. Brushy Fk.	2,836,400 103,000	Rapid River Snake River 22.5 31.1
1986	10,673,138	2,368,400 712,905 348,600 202,400 98,000 238,900	eggs, eggs, fry, fry, fry, Dworshak NFH Sawtooth Hatchery Crooked Fk. White Sand Ck. Big Flat Ck. Red R. Pond	2,630,200 400,600	Rapid River Snake River 19.0 19.8
1987	5,656,145	30,000 103,800 53,200 137,800 62,200 108,300 72,200 19,500	fry, fry, fry, fry, fry, fry, fry, fry, Little Salmon R. Lolo Ck. El Dorado Ck. Crooked Fk. Ck. Hopeful Ck. White Sand Ck. Big Flat Ck. White Sand Ck.	2,319,500 500,000	Rapid River Snake River 22.0 20.0

# Appendix 31. Release and transfer summary for Rapid River Hatchery 1964-1994 continued.

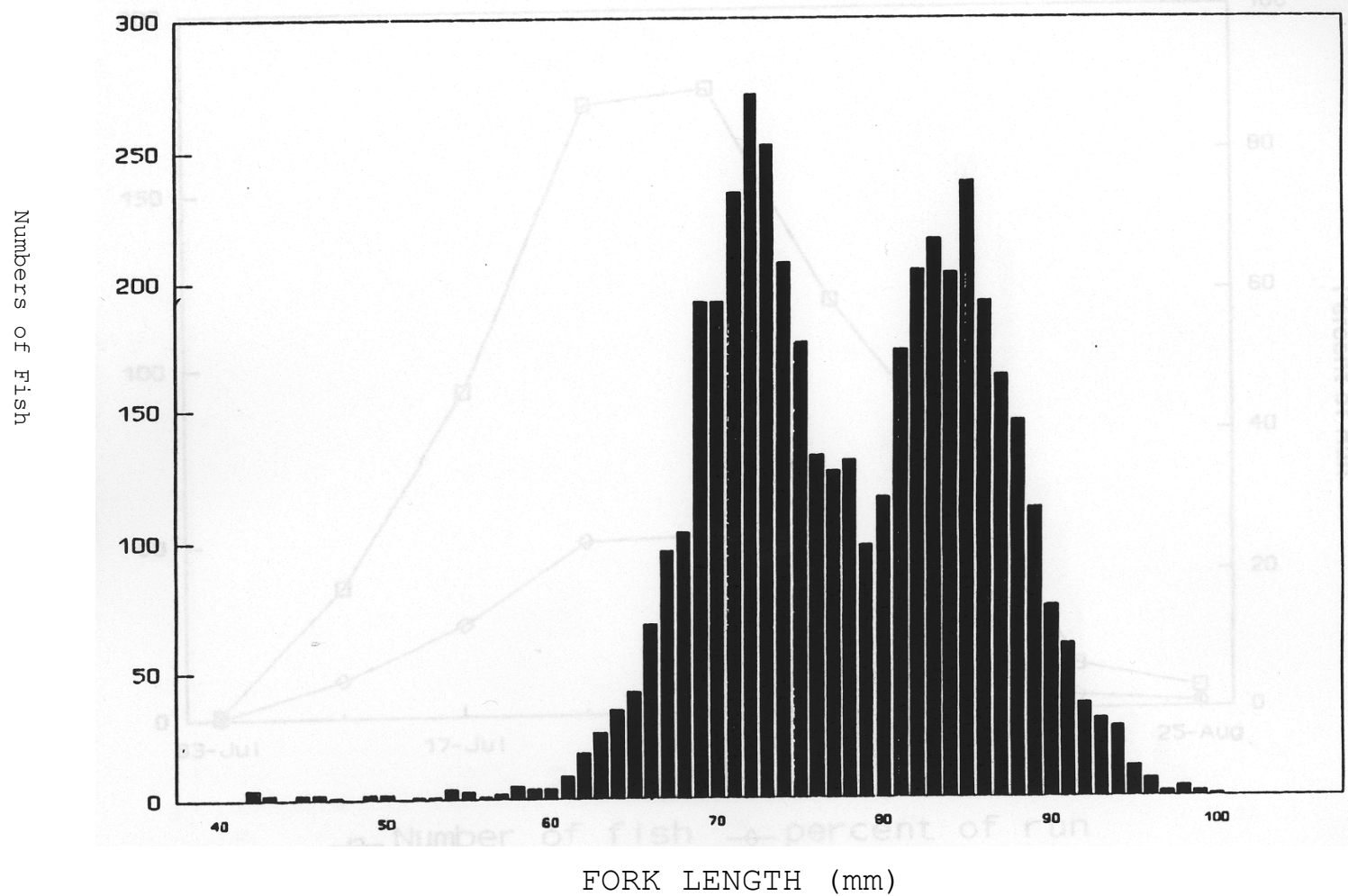
Brood Year	No. eggs taken			Egg, Fry Plants & Site	Smolt	Plants & Site	Fish/ pound
1987 continued							
		113,800	fry,	American R.			
		112,100	fry,	Newsome Ck.			
		100,100	fry,	Meadow Ck.			
		200,100	fry,	Crooked R.			
		50,100	fry,	Red R.			
		50,100	fry,	Yankee Fk.			
		202,000	fry,	Brushy Fk.			
		150,100	fry,	Ten Mi. Ck.			
		100,200	fry,	White Sand Ck.			
1988	7,881,379	1,475,677	eggs,	Oregon F&G	2,520,400	Rapid River	26.0
		149,570	fry,	Little Salmon R.	250,000	Little Salmon	27.8
		100,278	fry,	Ten Mile Ck.	551,200	Snake River	30.0
		149,570	fry,	Little Salmon R.			
		100,278	fry,	Ten Mile Ck.			
		101,062	fry,	Crooked R.			
		100,862	fry,	Crooked R.			
		100,628	fry,	Newsome Ck.			
		100,299	fry,	Boulder Ck.			
		100,342	fry,	Boulder Ck.			
		100,097	fry,	Newsome Ck.			
		195,398	fry,	Brushy Fk.			
		99,919	fry,	White Sands Ck.			
		100,148	fry,	White Sands Ck.			
		99,401	fry,	American R.			
		51,369	fry,	American R.			
		39,163	fry,	Meadow Ck.			
1989	3,925,585	211,209	fry,	Crooked River	2,564,900	Rapid River	24.2
		548,876	fry,	Sawtooth Hatchery	100,100	Little Salmon	22.5
					500,500	Snake River	22.5
1990	4,217,103	200,000	eggs,	Looking Glass Hatch.	2,615,500	Rapid River	20.3
		403,400	fry,	Sawtooth Hatchery	500,500	Snake River	20.3
1991	2,553,218	3,050	fry,	Hayden Ck Hatchery	2,060,300	Rapid River	24.7
		10,126	fry,	Squaw Creek	200,300	Snake River	26.8
		90,125	fry,	White Sand Creek			
1992	4,534,404	942,897	eggs,	Dworshak Hatchery	2,547,642	Rapid river	20.4
					380,600	Snake River	20.5
1993	6,404,312	2,176,157	eggs,	Clearwater Hatchery	2,786,919	Rapid River	18.5
					499,536	Snake River	19.1
1994	489,060	58,791	eggs	Clearwater Hatchery			

## RAPID RIVER SPRING CHINOOK RETURNS - 1993 SPRING CHINOOK WEEKLY TRAP COUNT



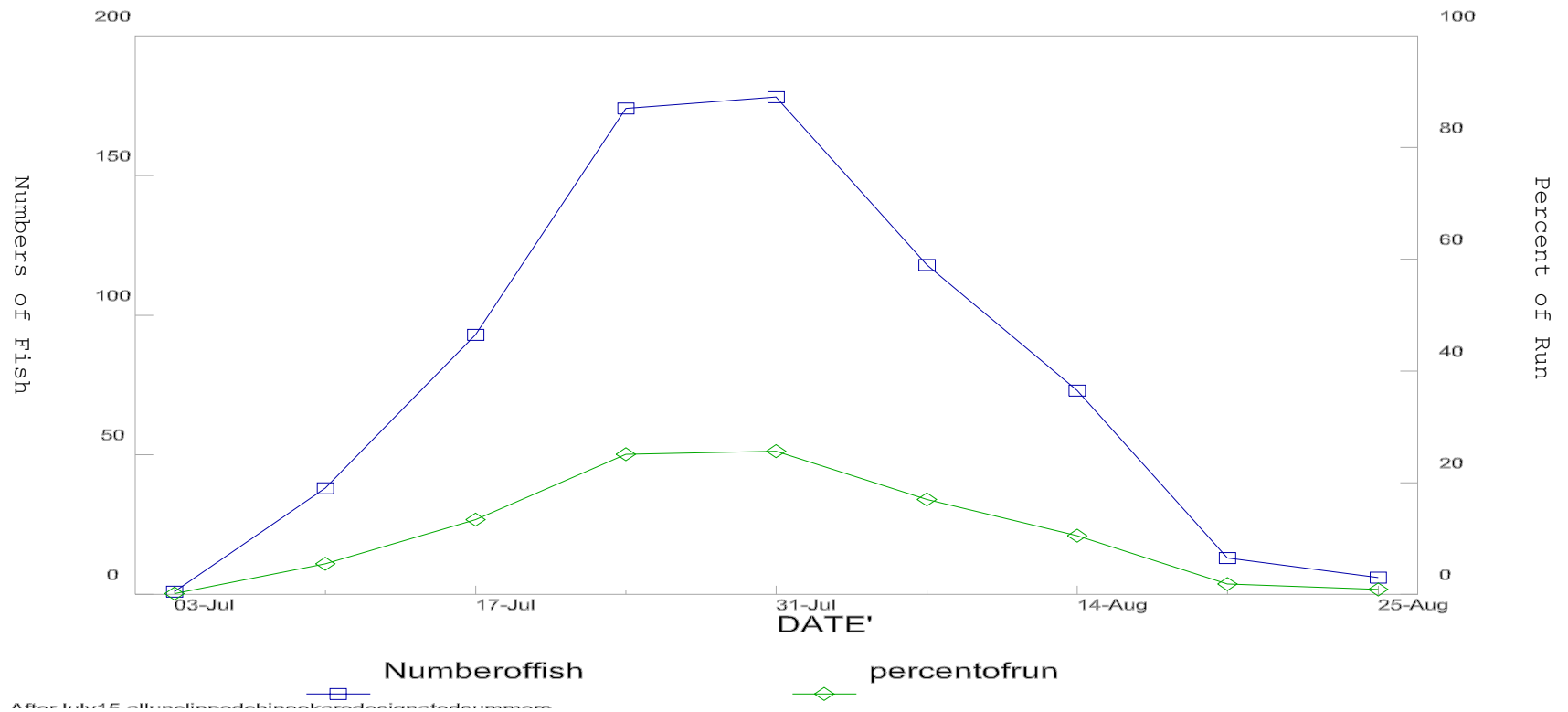
Appendix 33. Length frequency, Rapid River spring chinook, 1993.

RAPID RIVER SPRING CHINOOK RETURNS - 1993  
LENGTH FREQUENCY



Appendix 34. Run timing, Rapid River summer chinook, 1993.

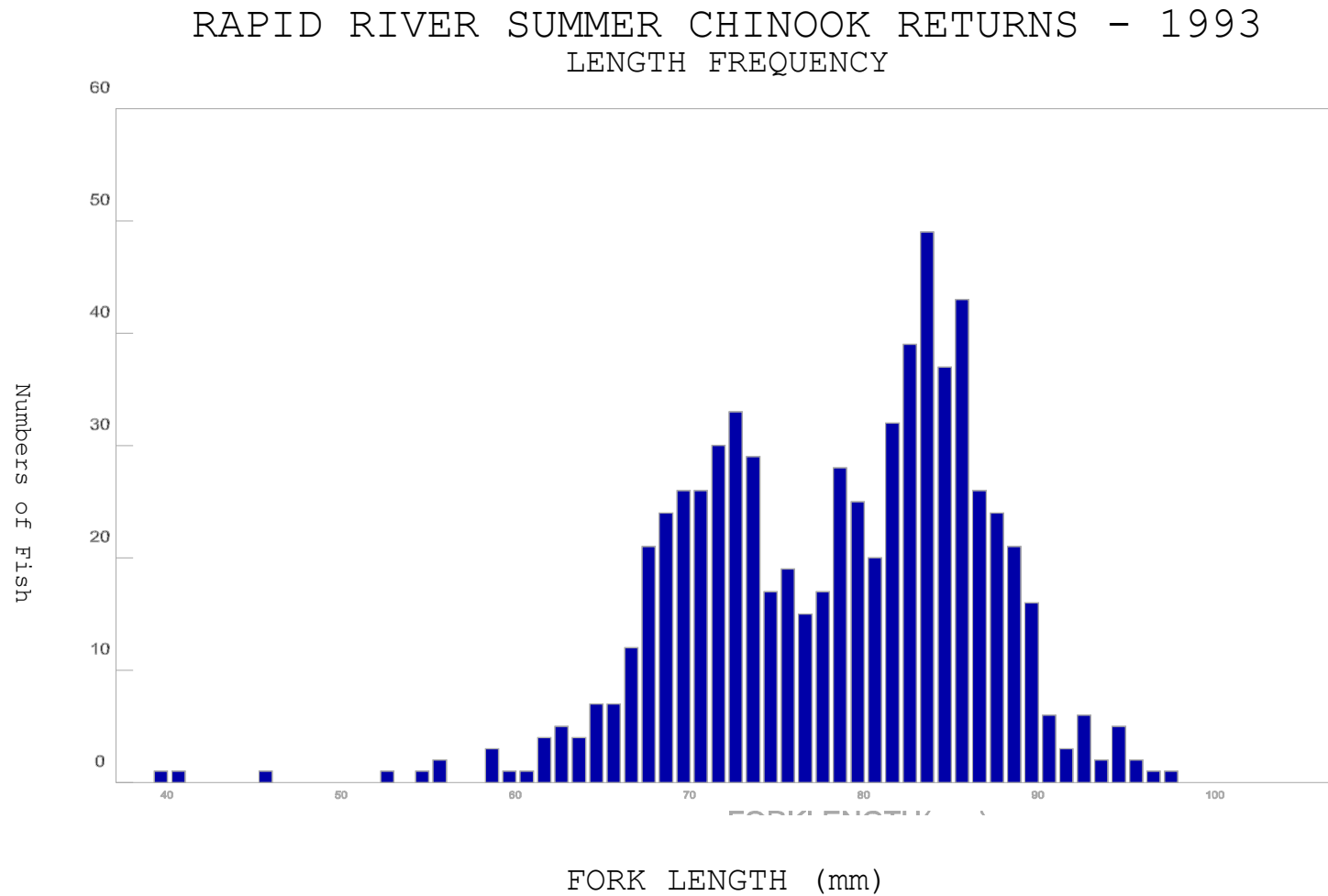
# RAPID RIVER SUMMER CHINOOK RETURNS - 1993 SUMMER CHINOOK WEEKLY TRAP COUNT



After July 15, all unclipped chinook are designated summers

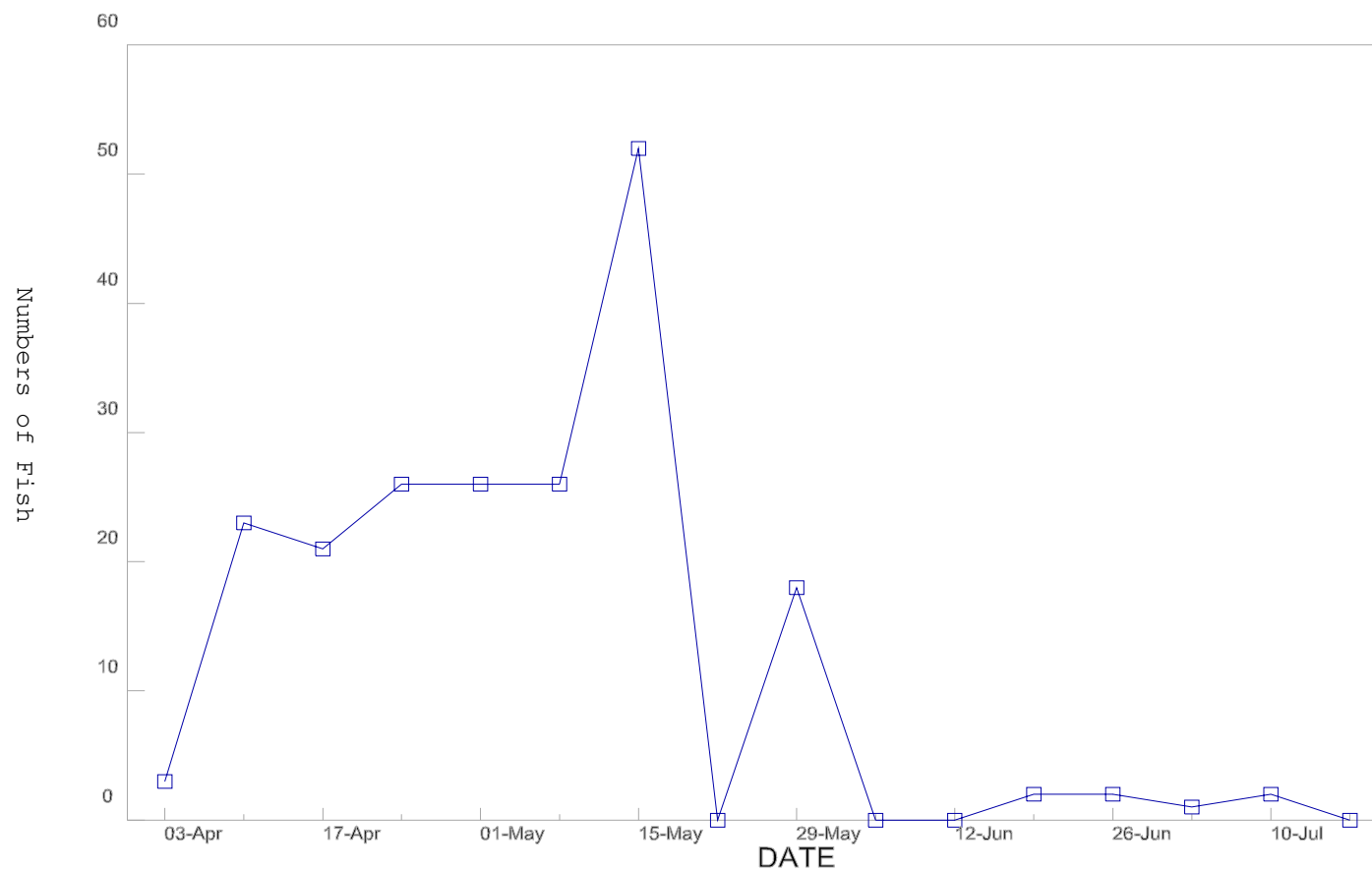


Appendix 35. Length frequency, Rapid River summer chinook, 1993.

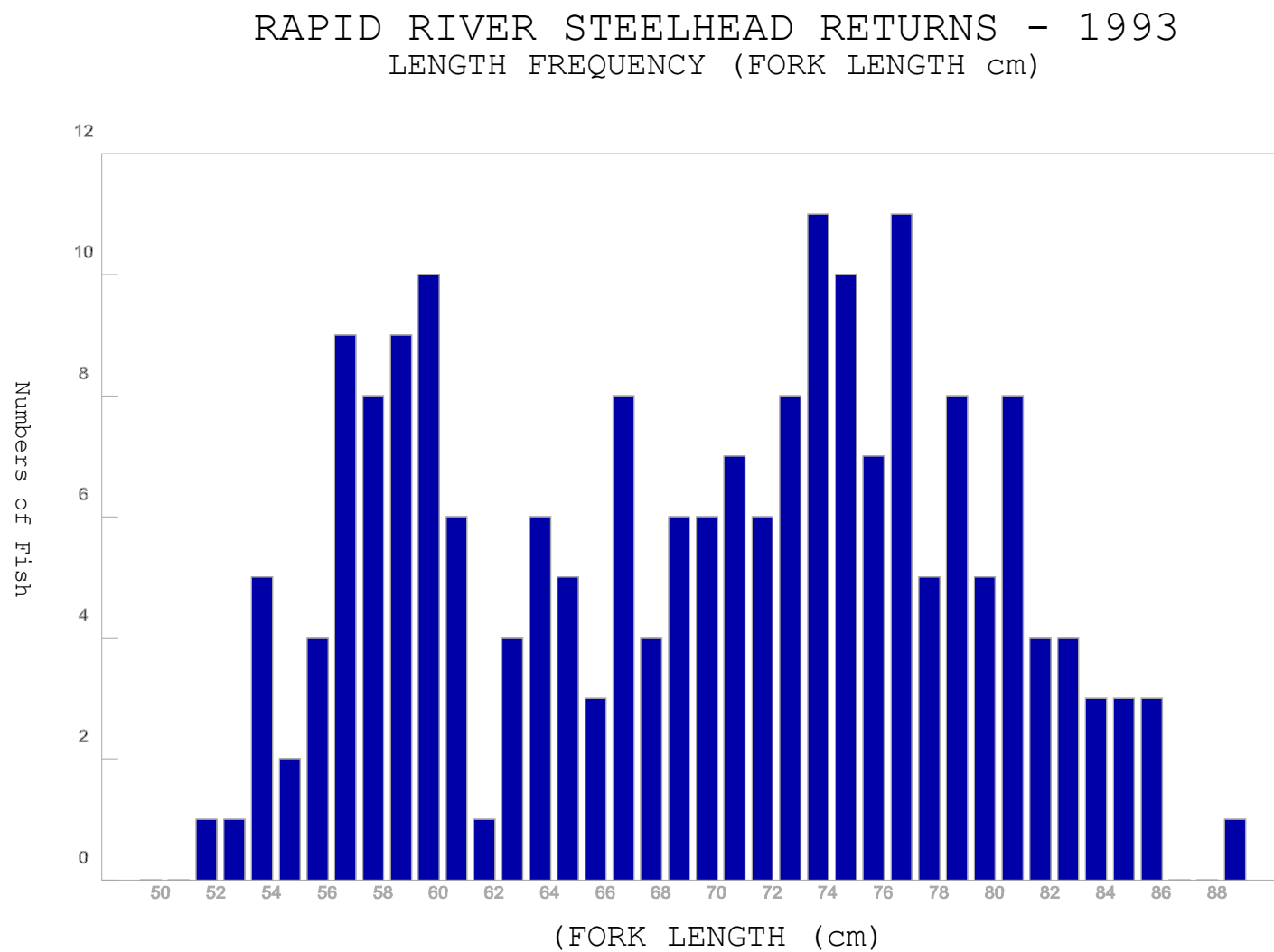


**Appendix 36. Run timing, Rapid River steelhead, 1993.**

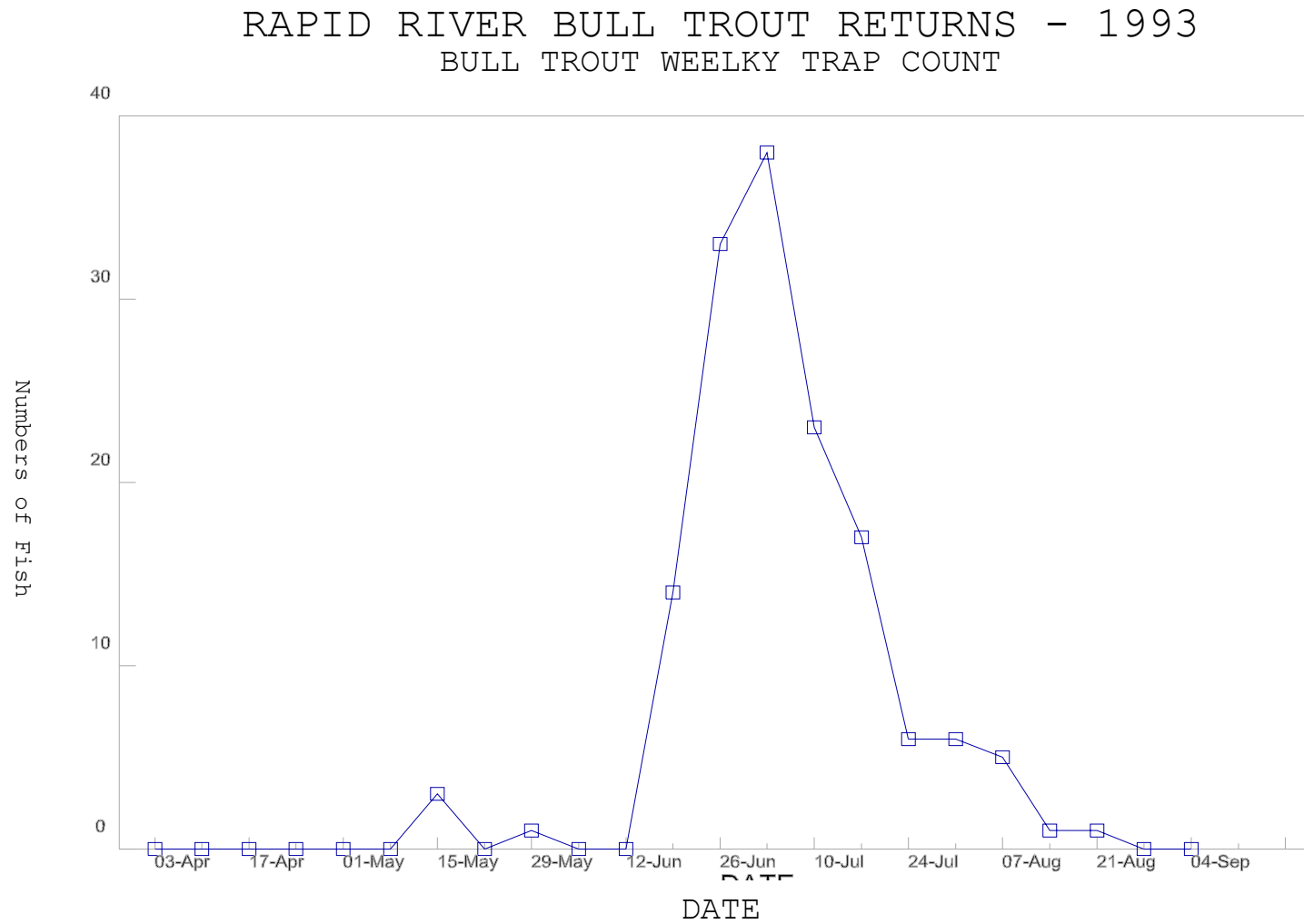
**RAPID RIVER STEELHEAD RETURNS - 1993**  
STEELHEAD WEEKLY TRAP COUNT



Appendix 37. Length frequency, Rapid River steelhead, 1993.

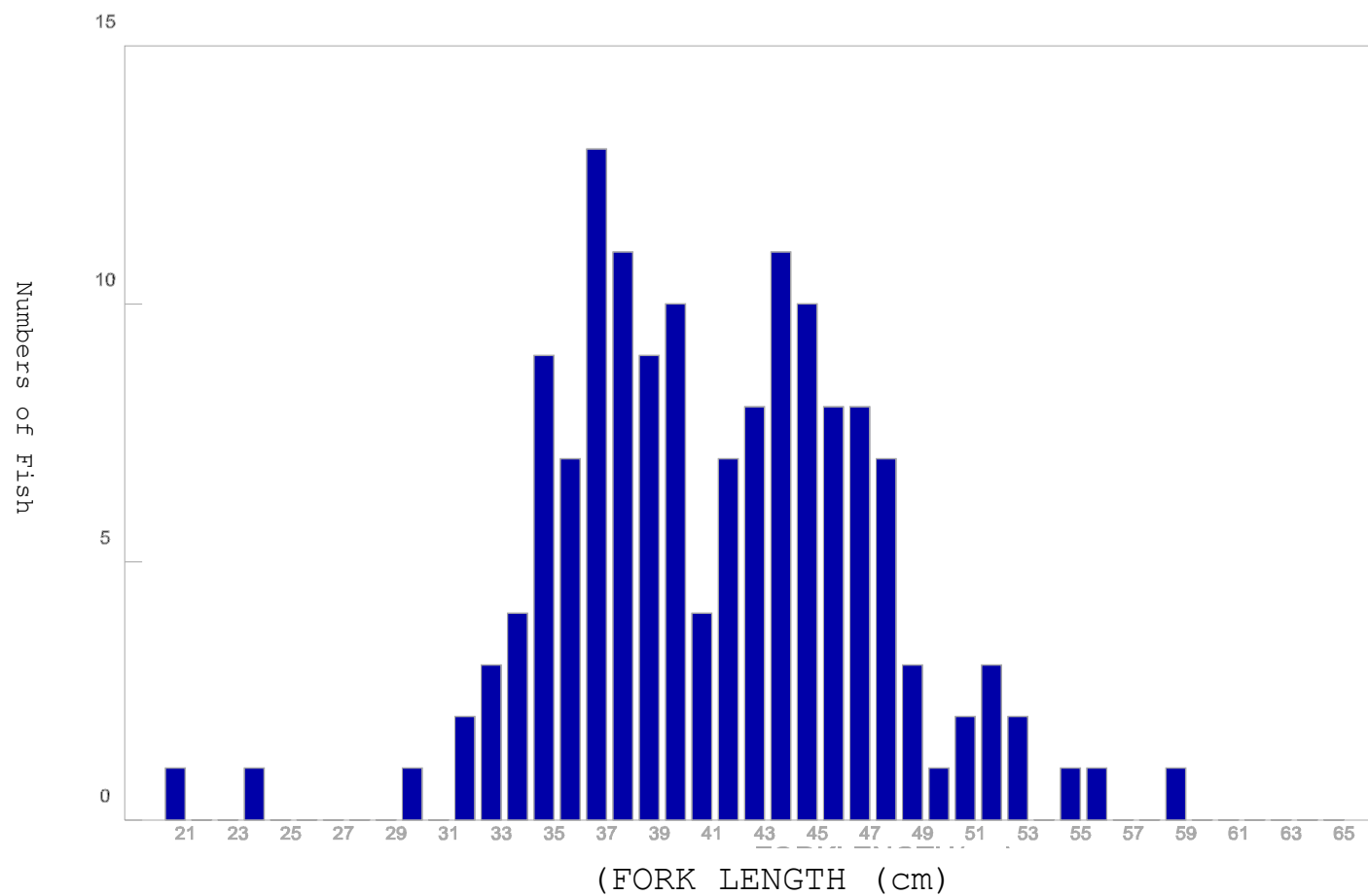


**Appendix 38. Run timing, Rapid River bull trout, 1993.**



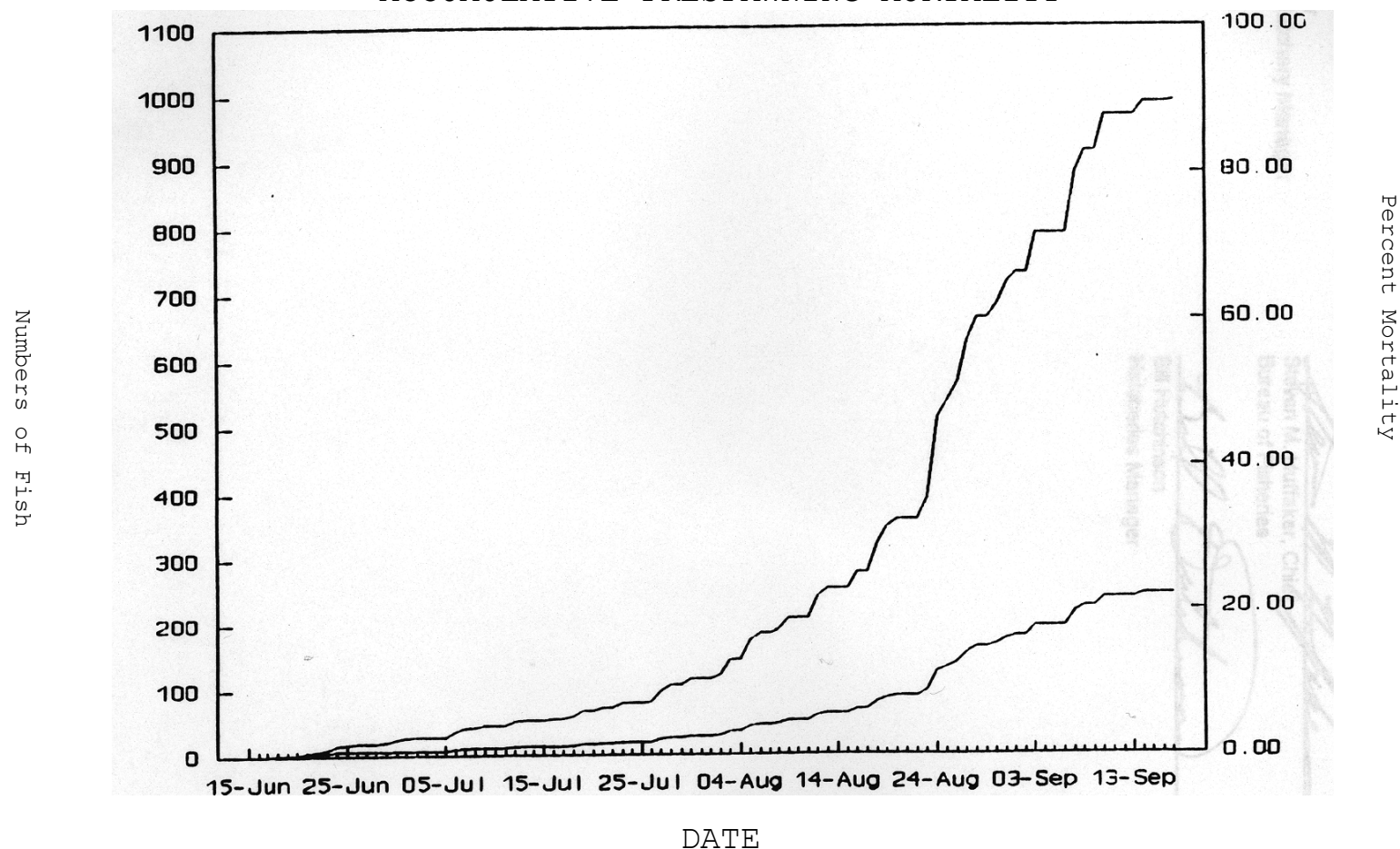
Appendix 39. Length frequency, Rapid River bull trout, 1993.

RAPID RIVER BULL TROUT RETURNS - 1993  
LENGTH FREQUENCY (FORK LENGTH cm)



Appendix 40. Prespawning mortality, Rapid River adults, 1993.

# RAPID RIVER SPRING CHINOOK - 1993 ACCUMULATIVE PRESPAWNING MORTALITY



The lower line is percent mortality as daily percent of trap to date.  
Starting August 18 all females were netted and handled twice each week

Submitted by:

Richard L. Lowell  
Fish Hatchery Manager II

Ralph E. Steiner  
Assistant Fish Hatchery Manager

Michele Baer  
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Approved by:

IDAHO DEPARTMENT OF FISH AND GAME

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Steven M. Huffaker, Chief  
Bureau of Fisheries

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Bill Hutchinson  
Hatcheries Manager